



CDC® MODULE DRIVE ADAPTER

GB145

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT
THEORY OF OPERATION
DIAGRAMS
MAINTENANCE
PARTS DATA

[illegible]

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MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
GB145-A	01 02 03 04*	DSO21951 DSO22171	
GB145-B	01 02 03 04*	DSO21951 DSO22171 DSO22257	
GB145-D	01 02*		
*FCC EMI qualified part. Use of non-qualified parts on FCC EMI verified systems will void system verification. Consult either the system FCC EMI warning label or the manual to equipment correlation sheet in the system hardware maintenance manual/field repair guide to determine system verification status.			

LIST OF EFFECTIVE PAGES

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PREFACE

This manual describes the operation, programming, and logic analysis at a maintenance level of the Control Data® Module Drive Adapter. This device utilizes a combination of hardware and firmware to perform its internal functions. At a systems level, the device functions as an intelligent interface between a central processing unit and a multiple disk drive system controller.

This manual is intended for people who have a working knowledge of programming, operation, and formats used in

disk systems. Hardware-oriented individuals should have a basic understanding of micro programming as applied to peripheral micro controllers.

An abbreviation for the micro-programmable processor (MP) is used in this manual. MP refers to 18-20, 18-25, and 18-30 products.

The CDC publications listed below provide additional information related to the operation and programming of the drive interface. These publications are as follows:

<u>Publication</u>	<u>Publication Number</u>
AA132, AA133, AA153, FC402, DT120 CYBER 18 Computer Systems Central Processor Field Repair Guide	60475001
BJ402, BJ701, BZ403, FA727, GB138, GB145 Module Drive Subsystem Field Repair Guide	60475051
BJ402 Storage Module Drive Hardware Maintenance Manual	83322450
BJ402 Storage Module Drive Hardware Reference Manual	83322460
BJ701/BJ7B1 Storage Module Drive Hardware Maintenance Manual	83311300
BJ701/BJ7B1 Storage Module Drive Hardware Reference Manual	83317300
BZ403 Mini-Module Drive Hardware Maintenance Manual	83322820
BZ403 Mini-Module Drive Hardware Reference Manual	83322830
CYBER 18 Computer Systems Overview Manual	60475000
CYBER 18 Computer Systems with MOS Memory Installation Manual	96768360
CYBER 18 Processor with MOS Memory Reference Manual	96768300
FA7A8/FA727 SMD Controller/Formatter Hardware Maintenance Manual	83312400
Operational Diagnostic System (ODS) Version 2 Reference Manual	96768410

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The module drive adapter is an intelligent controller that provides a generalized peripheral interface. The drive adapter, used in the CYBER 18 computer family, is an integral part of the module drive subsystem. It functions as an interface between a multiple disk drive subsystem and a central processing unit (CPU).

PHYSICAL DESCRIPTION

The drive adapter is a four-layer, 11- by 14-inch (279- by 356-millimeter) printed wiring assembly (PWA). It occupies one slot within the CPU chassis.

The module drive subsystem (figure 1-1) is comprised of no more than two drive adapters (one per CPU for dual configurations), the disk subsystem (consisting of one control unit), and any mixture of up to eight module disk drives.

FUNCTIONAL DESCRIPTION

The drive adapter provides a front end A/Q-DMA peripheral controller-type interface to the CPU backplane. Its back end interfaces through input/output (I/O) port cabling to a TAGBUS-type interface presented by the control unit front end. All communications and data exchanges between the CPU and the module drive subsystem must pass through the module drive adapter.

Software input and output commands to the module drive subsystem and status words of the module drive adapter, control unit, and disk drives are handled through the CPU A/Q-input/output channel. Data transfers are handled through the CPU direct memory access (DMA) channel. The module drive adapter contains a 64-word first-in/first-out (FIFO) data buffer and 16 file registers for setting up the sector, head, and cylinder addressing on the selected file.

Interface handshaking and internal control and data paths are directed by a read-only memory resident program (firmware) within the module drive adapter. The data word between the module drive adapter and the control unit consists of an 8-bit byte; between the module drive adapter and the CPU, 16-bit words are used.

LOGIC CIRCUITS

The module drive adapter utilizes standard transistor-to-transistor logic-type (SSI and MSI) packages for its control and data handling, MOS logic for data storage, and semiconductor memory (read-only memory) for implementing its control program logic (firmware).

POWER

The drive adapter logic obtains its power from the CPU system backplane. The drive adapter requires approximately 8 amperes at 5V dc for the logic circuits and -12V dc at 50 milliamperes for the FIFO buffer integrated circuits.

ENVIRONMENTAL CONDITIONS

Drive adapter cooling is accomplished by the fans in the CPU chassis. The drive adapter performs satisfactorily over a temperature range of 40° to 120°F (4.4° to 48.9°C) and a relative humidity range of 10 to 90 percent (noncondensing).

PROCESSING RATE

The drive adapter is designed to handle the maximum peak data-transfer rate of the disk. The maximum data-transfer rate of the drive adapter to/from the CPU is 605 kHz (1.65 microseconds per word).

MODULE DRIVE SUBSYSTEM FEATURES

The module drive subsystem consists of several components. Standard features and options are supported by the subsystem hardware. They are mentioned here as an aid to understanding the programming and operation of the drive adapter.

ERROR CORRECTION

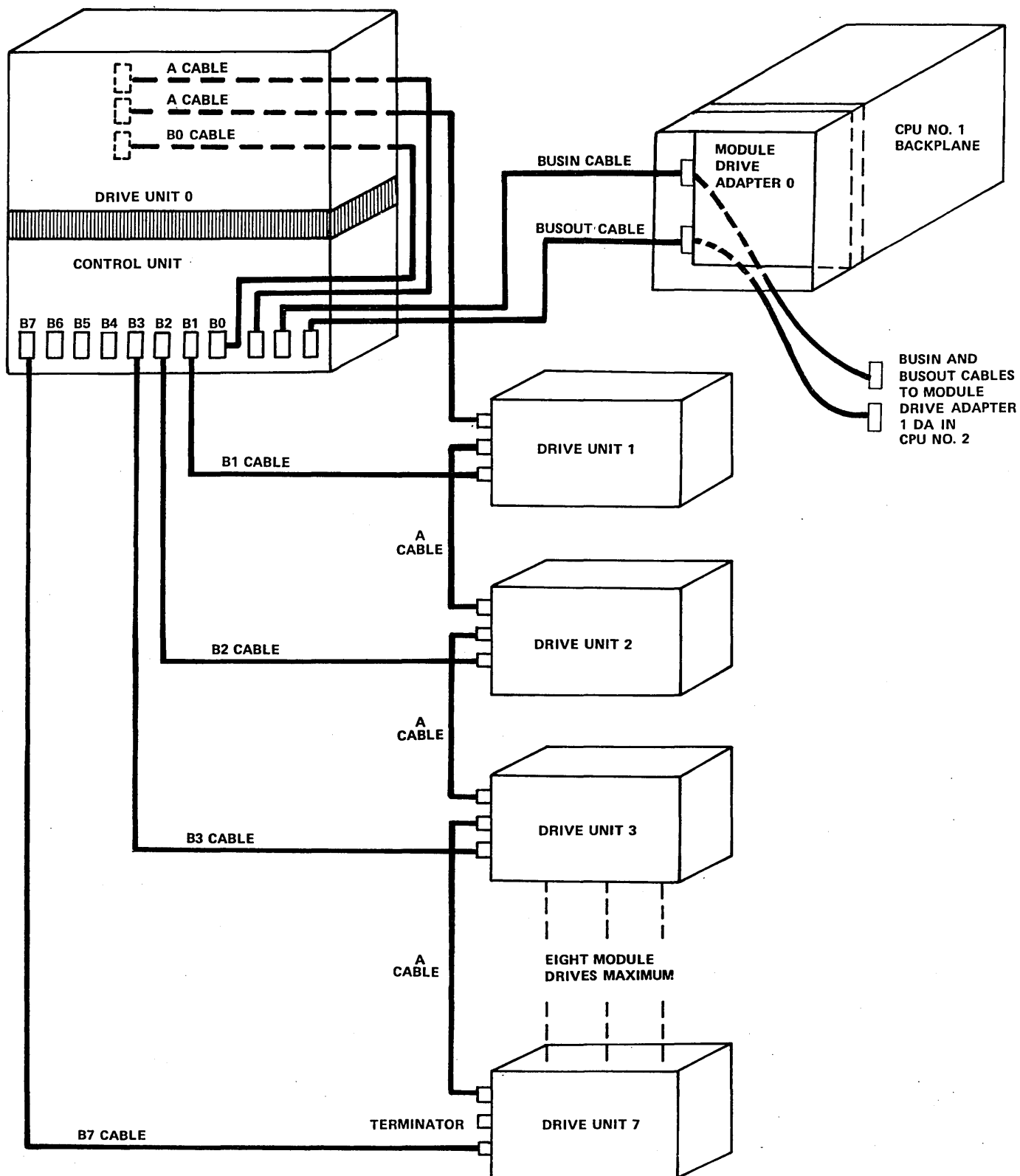
A 56-bit error correction code (ECC), with the control unit, is capable of detecting any single 22-bit (or less) error bursts in any physical record. Correction of any single 11-bit (or less) error burst is accomplished at the direction of the system software.

FOUR-DRIVE EXPANSION

The four-drive expansion feature allows the multiplexing capability of the control unit to expand from the standard four drives to a maximum of eight drives.

DUAL ACCESS

The dual-access feature, provides the capability to access the control unit from two CPUs, (each interfaced with a drive adapter). Control contention must be resolved by the drive adapters through software assistance.



NOTE: FOR ADDITIONAL DETAILS, REFER TO THE MODULE DRIVE SUBSYSTEM HARDWARE MAINTENANCE MANUAL.

0365-1

Figure 1-1. Module Drive Subsystem

ERROR RECOVERY AIDS

The drive-type dependent error recovery aids, two values of drive head offset, and two variations of data recovery timing can be selected by software to assist in error recovery procedures.

ROTATIONAL POSITION SENSING

A rotational position sensing (RPS) capability, included via a status command, allows the program to read the physical number of the sector currently under the read/write heads of the selected drive.

SECTOR INTERLACE

The capability for a software-prescribed sector interlace scheme is included. It allows the software to create logical sectors regardless of the physical (sequential) sector numbering.

OVERLAPPED SEEKS

A seek-end condition, occurring on any drive, is logged by the control unit and flagged to the appropriate drive adapter. A software poll command is used to determine which drive is in the seek-end condition.

LOGICAL-TO-PHYSICAL DRIVE NUMBER CORRELATION

The logical-to-physical drive number correlation feature provides a software command to correlate the selected drive's physical unit number with its logical unit number.

SELECTABLE SECTORING

The number of sectors per revolution can be selected over a range of 4 to 128 by setting up the sector plug or sector switches on the drive. The standard number of sectors per revolution is 64. (Refer to section 3 for available options.)

AUTOLOAD

The autoloading feature initiates a bootstrap read of 6,144 words from cylinder, head, and sector 0 on the selected drive (based on the preset autoloading drive jumper configuration).

DRIVE ADAPTER SELF-TEST

The drive adapter internal data paths, data buffering capabilities, and DMA control logic may be tested independently of the control unit and disk drives via self-test read/write commands.

DATA ECHO

Two levels of data echo capability are included as maintenance and diagnostic aids. The first level allows data to be output through the drive adapter to the control unit receivers and transmitters and back to the CPU. The second level verifies the data path to the selected drive receivers and returns to the CPU through the drive transmitters.

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This section contains descriptions of the jumper selectable parameters, register formats, A/Q and DMA operations, and programming considerations for the drive adapter.

PARAMETER JUMPERS

The drive adapter contains several solderless jumpers that are visible when the drive adapter board is removed from the CPU chassis. These jumpers implement system parameters that define equipment configuration and operating modes. The functions of the jumpers are described in this section. For further information on the jumper pin numbers refer to the CYBER 18 Computer Systems with MOS Memory Installation Manual.

EQUIPMENT NUMBER

Bits 7 through 10 of the Q register (E field) contain the I/O device address/equipment number on all A/Q-input/output commands. Four jumpers, representing hexadecimal codes 0 through F, must be set to correspond to the correct equipment number.

PROTECT OVERRIDE

The drive adapter may operate as a protected or unprotected I/O device. One jumper provides a method for selecting this option, which enables DMA writes into protected memory.

AUTOLOAD SELECT

One jumper selects the method of enabling the autoloading. In one position, the autoloading may be enabled by a form C switch. In the other position, the autoloading may be enabled by a logic level pulse of 100 nanoseconds or greater.

AUTOLOAD DRIVE NUMBER

Four jumpers are provided for selecting the logical drive unit number when an autoloading (bootstrap) operation is initiated from the console. After depressing the AUTOLOAD switch, the selected disk drive seeks to address 0 (cylinder, head, and sector 0) and reads 6,144 sequential words from this area. This data is stored in sequential CPU memory locations, beginning with location 0.

20-BIT MEMORY ADDRESSING

Two jumpers are required to select either 18-bit or 20-bit memory addressing.

DUAL-CPU CONFIGURATION

In a dual-CPU system, two drive adapters can be connected to a single control unit. Communication occurs

between the two drive adapters and the control unit. For proper operation, each drive adapter must be configured with jumpers so that it transmits and receives only those signals that correspond to its unit number. Unit 0 is the first drive adapter on the daisy-chain cable from the control unit. Unit 1 is the second drive adapter on the cable. The jumpers and their applications are as follows:

- One jumper is required to allow the drive adapter to generate an interrupt to the CPU upon receiving a seek-end interrupt from its disk drive.
- One jumper is required to interrupt the alternate drive adapter.
- One jumper is required to receive the interrupt from the alternate drive adapter.
- One jumper is required to sample the control unit request line (select hold).
- One jumper is required to transmit a request (select hold) to the control unit.

MODULE DRIVE ADAPTER REGISTERS

The drive adapter contains registers and counters that support software and/or hardware functions. These registers are divided into three categories.

PROGRAM REGISTERS

Program registers are accessible through software A/Q-input/output commands. These registers are necessary for setting up and executing disk drive data transfer operations. Table 2-1 lists these program registers and their applications. The software function codes that reference these registers are detailed under the subheading A/Q Command Description.

HARDWARE REGISTERS

The hardware registers are not accessible by software; they are used internally for control of subsystem operations. These registers are described in section 4.

FILE REGISTERS

File registers are the internal working registers. These are sixteen 8-bit registers addressed as 0 through F (hexadecimal). All file registers may be written into, or read by, software.

The first nine files (0 through 8) and the last file (F) contain the read information from the address field of the last sector operated on following a data read or write operation. The remaining seven files contain constants or working data for the particular function being performed. The file registers and their application are identified below.

TABLE 2-1. MODULE DRIVE ADAPTER PROGRAM REGISTERS

Register Name	Length (Bits)	Data Loaded By	Data Read By	Register Cleared By	Application
Buffer length	0-15 (16)	Function code 0	Hardware	Master clear or clear drive adapter function	Set to number of words to be transferred between file and main memory
Current word address, lower	0-15 (16)	Function code D	Hardware	Master clear or clear drive adapter function	Set to 16-bit memory address of first data word (FWA) to be transferred between file and main memory under direct memory access control
Current word address, upper	16-19 (4)	Function code E	Hardware	Master clear or clear drive adapter function	Set to most significant four bits of first memory address for memory capacities of up to 1.048 million
Cylinder address (file 3, 4)	0-9 (10)	Function code 5	Function code 5	None	Set to desired cylinder address
Sector and head address (file A, B)	0-F (16)	Function code 7	Function code 7	None	Set to desired sector and head address
Interrupt mask	1-6 (6)	Function code 8	Hardware	Master clear or clear drive adapter function	Set to enable/disable drive adapter interrupt conditions
Drive adapter status	0-15 (16)	Hardware	Function code 8	Clear drive adapter function	Contains current status and alarm conditions within the drive adapter

File 0 – Field Length, Lower

The field length file is the number of bytes, minus 1, in the data field of this sector.

File 1 – Sector Address

File 1 is the actual logical sector address read from the address field of each sector on the selected drive.

File 2 – Head Address

File 2 is the same as file 1, except it contains the head address.

File 3 – Cylinder Address, Lower

File 3 contains the least significant eight bits of the cylinder address that was read from the address field on the selected drive. File 3 is also used to hold the software-supplied initial cylinder address following a load cylinder address function and preceding a read or write operation.

File 4 – Cylinder Address, Upper

File 4 contains the most significant two bits of the cylinder address that was read from the address field on the selected drive. File 4, like file 3 is used to hold the software-supplied initial cylinder address following a load cylinder address function and preceding a read or write operation.

File 5 – Flag Byte 4

This flag byte is not used by the subsystem hardware. The operating system software may use this field for a write protect flag or an alternate track assignment.

File 6 – Flag Byte 3

File 6 is the same as file 5.

File 7 – Flag Byte 2

File 7 is the same as file 5.

File 8 – Flag Byte 1

File 8 is the same as file 5.

File 9 – Autoload Compare/Heads Per Device

This register contains a hexadecimal 30 following an autoload sequence. It is used as a drive-ready and on-cylinder status compare word for testing drive status during an autoload sequence. This file is used also during read/write operations as temporary storage of the maximum number of heads of the selected drive. This is used for detection of the end-of-cylinder condition.

File A – Target Sector Address

Preceding a data read or write, this register receives the initial target logical-sector address as specified via a software set sector and head command. Following a data read or write, this register contains the address of the last sector operated on. During data read or write operations, the drive adapter increments this register as the transfer extends across sector boundaries.

File B – Target Head Address

Preceding a data read or write, this register receives the initial target head address as specified by a software set sector and head command. Following a data read or write, this register contains the address of the last head operated on. During data read or write operations, the drive adapter increments this register as the transfer extends across head boundaries.

File C – Constant of 0

The file C register always contains 0. It is used internally, within the drive interface, for testing register conditions of 0.

File D – Time-Out Counter/Target Cylinder Address

The file D register is used internally to time certain commands and responses for the control unit. During read/write operations this file operates the same as file A, except that it contains the lower eight bits of the target cylinder address.

File E – Read/Write Retry Counter

The file E register is used during data read or write operations while searching for the correct sector and head to operate on. The drive adapter reads the address field of 128 sectors in search of the target cylinder, sector, and head address. If this register ever reaches a 0 count during a read or write command, it indicates that the drive adapter was unable to find the specified cylinder, sector, and head address, and the operation is aborted.

File F – Field Length, Upper

File F, the upper five bits of the field length, is used during a data read or write operation. Bit 7 is the bad

sector flag and, if set to a 1, indicates that the address field was written with this bit set. This flag may be used in conjunction with the flag bytes for alternate track/sector assignment.

PROGRAMMING

The drive adapter communicates with the CPU via the A/Q and DMA input/output channels. The A/Q channel provides the drive adapter with a direct connection to the CPU A and Q registers. All operations on the A/Q channel are initiated by execution of the software instructions input-to-A or output-from-A. The Q-register contents are always output along with the A-register contents for an output-from-A instruction. For an input-to-A instruction, the Q register is output, but the drive adapter inputs a single word into the CPU A register.

A/Q-COMMAND CATEGORIES

The CPU A register transmits to, or receives information from, the drive adapter under A/Q-input/output command operations. The application of the information contained in the A register falls under the following general categories:

- Single-word transfer, output from A - The CPU A register data is used to load registers, clear control logic, initiate requests, transmit test data, and select drives as directed by specific bit assignments of the A register.
- Single-word transfer, input to A - This A/Q operation is used to read status words, registers, test data, and control logic conditions into the CPU A register.
- Control, output from A - This operation initiates motion control (seek operations) to the selected disk drive's head positioning logic, based on the contents of the CPU A register.
- Data handling output from A - This operation sets up the drive adapter for initiating buffered transfers of data between the drive and main memory under DMA control.

DMA OPERATION

Prior to initiating a memory transfer, a sequence of A/Q-output instructions are issued. These instructions are as follows:

- Seek/load cylinder address
- Sector and head address
- Load first word address (FWA)
- Load buffer length

The DMA transfer is initiated by either a DMA read, or DMA write, A/Q command.

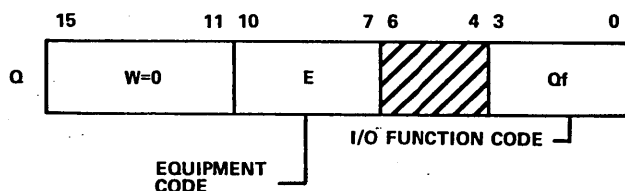
As data becomes available, the drive adapter, through the control paths of the DMA channel, makes a request to the

CPU for a memory cycle. The link to the DMA channel is established for one data transfer when the CPU memory acknowledges the memory request. Upon receiving the memory accept signal, the drive adapter transfers a single data word to, or from, the CPU memory via the direct memory access data path. The drive adapter memory address register is incremented and its buffer length (word count) register is decremented by one, following each data transfer. The DMA channel communication continues to be periodically activated by drive adapter hardware until the buffer length register has been decremented to 0. At that time, the transfer to, or from, memory is complete.

A/Q-INPUT/OUTPUT COMMAND FORMAT

The Q register is loaded by the CPU program with the equipment number plus the input/output function. The A register is loaded by the CPU program for all output operations (control, single word out, data handling) and is set to either an auxiliary input/output function or input/output function parameters, depending on the particular output command.

For A/Q-input operations (single word in and status), the CPU A register is loaded with the specific data that was requested by the function code contained in the Q register. The Q-register format for all A/Q operations is as follows:



Q-REGISTER FIELDS

The E portion of the Q register defines the disk adapter's equipment code. This code is configuration dependent and hardware implemented by four equipment select jumpers.

The field contained in Q-register bits 0 through 3 (Qf) defines the I/O function to be performed by the storage module system.

A-REGISTER CONTENT

The A register is used to define the function, or contain data, for the operation. The definition of each bit or field in the A register varies with the particular function code in the Q register (Qf). (See the A/Q Command Description subheading.)

For A/Q-input operations (single word in and status) the definition of the bits into the A register is again related to the Qf.

A/Q COMMAND DESCRIPTION

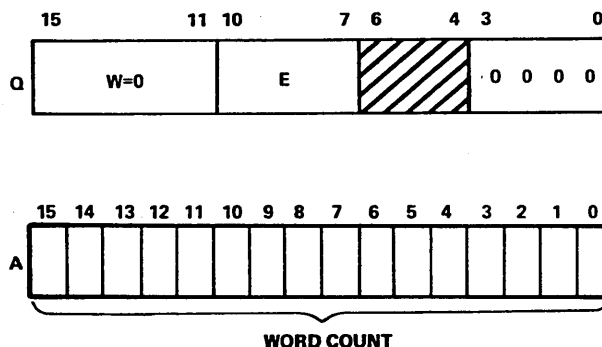
The following section lists the A/Q commands, in numerical order, with the output command followed by the input command of the same code number. A functional description of each command and an application for the command is provided when necessary.

Table 2-2 lists the function codes in numerical order and may be used as an index to the functional descriptions. Note the suffix -1 following certain function codes denotes that this same code is used to perform different I/O operations. The differences are qualified by the A-register data accompanying the function and are explained further within the functional description. Except where noted under programming considerations, all A/Q commands require a not-busy drive adapter and a selected control unit to be capable of accepting the command. (Refer to Programming Aids and Considerations subheadings at the end of this section.)

Tables 2-3, 2-4, and 2-5 list the functions in a quick reference format by their major functional categories.

BUFFER LENGTH

FORMAT: OUTPUT
FUNCTION CODE: 0



The buffer length command loads the drive adapter buffer length register with the transfer word count.

The CPU A register must be set by the program to the total number of 16-bit words that are transferred under DMA control. This word count is then loaded into the buffer length register by function code 0. During a DMA read or write operation, the drive adapter decrements this word count by 1 for every 16-bit data word transferred. When the buffer length register equals 0, the DMA transfer is complete.

The buffer length command is used in preparation for initiating a DMA read/write address, data, or ECC (function codes 9 or A).

When the buffer length register is initialized to 0, any following initiate DMA read or write command is interpreted as a test mode read or write operation.

TABLE 2-2. MODULE DRIVE ADAPTER FUNCTION CODES (Qf)

When Q-Register Bits 0 to 3 Equal:	Input-to-A Instruction Causes A Register to Receive:	Output-from-A Instruction Causes the Following Operation:
0	Read file register data	Set data buffer length register
1	Physical unit number	Set drive request
2	Poll status	Initiate poll
3	Select acknowledge status	Drive unit select
3-1	Drive characteristics status	--
4	Drive echo input data	Drive echo output data
5	Cylinder address status	Seek/load cylinder address
6	Current physical sector address	Format write
7	Sector and head address status	Load sector and head address
8	Drive adapter status	Director function
9	Drive status word 2	Initiate read
9-1	--	Test mode read
A	ECC pattern	Initiate write
A-1	--	Test mode write
B	ECC condition status	ECC control
C	Drive fault status	Status clear control
C-1	--	Read recovery control
D	Control unit status	Set first word address, lower
E	Drive status word 1	Set first word address, upper
E-1	--	Select file address/write file
F	Control unit echo input data	Control unit echo output data

TABLE 2-3. SINGLE-WORD TRANSFER, INPUT FUNCTIONS

Category	A/Q Function Name	Qf Function Code	Operation
Control and register read back	Poll status	2	Inputs drive request and seek condition status
	Physical unit number	1	Inputs physical drive unit and number of currently selected logical drive
	Select acknowledge status	3	Inputs logical drive number and drive type status following a unit select function
	Drive characteristics status	3 [†]	Inputs drive characteristics status (MMD only)
	Cylinder address status	5	Inputs contents of drive adapter cylinder address register
	Current physical sector status	6	Inputs physical sector number currently under heads of selected drive
	Sector and head status	7	Inputs current contents of drive adapter sector/head register
Status	Disk adapter	8	Inputs current drive adapter status
	Control unit	D	Inputs current control unit status
	Drive status 1	E	Inputs selected drive basic error conditions
	Drive status 2	9	Inputs basic status condition of selected drive
	Drive fault	C	Inputs fault conditions of selected drive
[†] This function returns the drive-capacity and fixed-head information from the mini-module drive if the preceding unit select was accompanied by bit 5 set to a 1 in the A register.			

TABLE 2-4. SINGLE-WORD TRANSFER, OUTPUT FUNCTIONS

Category	A/Q Function Name	A/Q Function Code		Description of Operation
		Q00-Q03	A00-A15	
Drive initialization	Clear adapter [†]	8	0001 (hex)	Clears all control, interrupt, and fault alarm conditions
	Director function	8	Interrupt enable pointers	Enables/disables interrupts and transmits connect/disconnect requests to the alternate drive adapter and control unit
	Drive request	1	Logical drive address and request flag	Flags a request for a drive to the alternate drive adapter via the control unit
	Initiate poll	2	Poll conditions and logical drive group	Fetches what current channel activities, seek conditions, or active requests exist for a group of logical drives
	Unit select	3	Logical drive address	Selects 1 of 16 logical drives
	Fetch drive characteristics	3	Logical drive address plus bit 5	Fetches drive characteristics (MMD only)
	Buffer length	0	Length of buffer	Loads the drive adapter buffer length register with the number of 16-bit words to be transferred
	Set first word address, lower	D	Memory address of first data word	Loads the lower 16 bits of memory address into the drive adapter current word address register
	Set first word address, upper [†]	E	Memory address, most significant bits	Loads the upper two bits of 18-bit memory address into the drive adapter current word address register
	Status control [†]	C	Status conditions to be cleared	Selectively clears general- and error-status conditions as directed by bits 0 through 6 in the A register
	Load cylinder address	5	Cylinder address plus bit 15	Loads the desired cylinder address in the drive adapter
Control, out	Seek	5	Cylinder address	Initiates a seek operation on the selected drive to that address
	Return to 0 [†] (home heads)	C	0080 (hex)	Returns the heads in the selected drive to cylinder address 0 and clears seek error status
[†] Pseudo-operation; subset of basic function				

TABLE 2-4. SINGLE-WORD TRANSFER, OUTPUT FUNCTIONS (Contd)

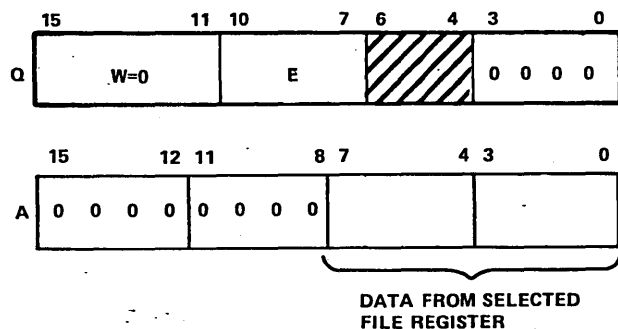
Category	A/Q Function Name	A/Q Function Code		Description of Operation
		Q00-Q03	A00-A15	
Disk addressing	Sector, head address	7	Head/sector address	Loads the desired sector and head address into the drive adapter head/sector register
Data handling	Format write	6	0000 (hex)	Initializes selected track (erase)
	Write (data)	A	HH00 (hex) [†]	Initiates DMA write data operation
	Write (address)	A	HH80 (hex) [†]	Initiates DMA write track address operation
	Read (data)	9	HH00 (hex) [†]	Initiates DMA read data operation
	Read (address)	9	HH80 (hex) [†]	Initiates DMA read track address operation
	Read (data ECC)	9	HH40 (hex) [†]	Initiates an ECC data read. No data is transferred to memory
	Read (address ECC)	9	HHC0 (hex) [†]	Initiates an ECC address read. No data is transferred to memory
[†] The upper eight bits (HH) must contain the number of heads on the device.				

TABLE 2-5. INPUT/OUTPUT FUNCTIONS

Category	A/Q Function Name	Mode	A/Q Function Code		Operation
			Q00-Q03	A00-A15	
Error recovery	ECC control (shift correction code)	Out	B	Shift code	Manipulates the ECC register bytes per A-register bits 4 or 5
	ECC condition status	In	B	ECC byte conditions	Inputs the ECC byte condition status to the A register
	ECC pattern	In	A	ECC pattern	Inputs bits 11 through 18 of the ECC pattern to the A register
	Read recovery control	Out	C	Data strobe/head offset	Outputs bits 8 through 15 of the strobe/offset word from the A register
Diagnostic test	Test mode write [†]	Out	A	0000 and buffer length = 0	Loads the drive adapter FIFO buffer; outputs 64 sequential words starting from first word address in the CPU memory
	Test mode read [†]	Out	9	0000 and buffer length = 0	Inputs the FIFO buffer into 64 sequential CPU memory locations starting with first word address
	Select file address [†]	Out	E	File register address plus bit 6	Selects 1 of 16 internal file registers per bits 0 through 3 of the A register
	Write file	Out	E	File address plus bit 7	Writes bits 8 through 15 into the specified file
	Read file	In	0	Contents of selected file register	Inputs the eight-bit data byte from the selected file register to the A register
	Control unit echo output	Out	F	Test pattern	Outputs the test pattern from bits 0 through 7 of the A register to the control unit
	Control unit echo input	In	F	Test pattern	Inputs the test pattern from the control unit to A-register bits 0 through 7
	Drive echo output	Out	4	Test pattern plus bit 7	Outputs the test pattern from bits 0 through 6 (bit 7 equals 1) of the A register to the selected drive
	Drive echo input	In	4	Test pattern	Inputs the test pattern from the selected drive to bits 0 through 6 of the A register
[†] Pseudo-operation; subset of basic function					

READ FILE

FORMAT: INPUT
FUNCTION CODE: 0



The read file command reads data from the selected 1 of sixteen 8-bit file registers.

This input command causes the contents of the file register, previously selected by a select file command, to be input to A-register bits 0 through 7.

The read file command is primarily a diagnostic or fault isolation aid in that it provides direct access to the primary working storage within the drive adapter.

The drive request command requests the drive from the control unit when the alternate drive adapter is finished with it.

A-register bits 0 through 3 specify the logical drive number. Bit 4 causes the request flag in the control unit associated with that logical drive number to be set or cleared. This flag can then be read by the alternate drive adapter via a poll command.

Bit 5 = 1 clears the seek-complete status bit for the logical drive designated by A00 through A03.

NOTE

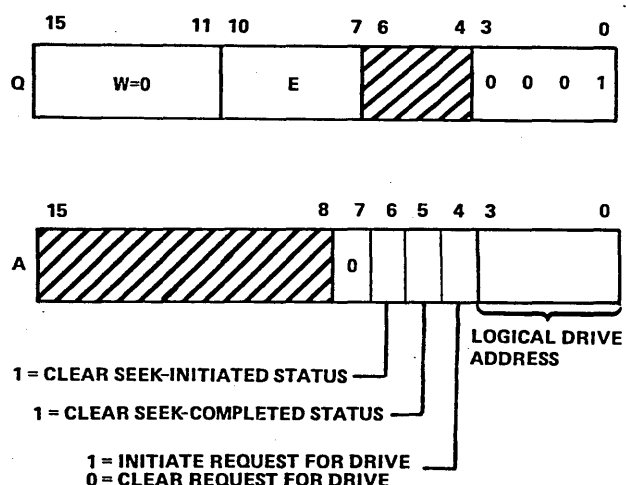
The seek-complete status also is cleared by initiating any seek operation on the selected drive.

Bit 6 = 1 clears the seek-initiated status flag in the logical drive designated by A00 through A03. This is used to establish initial control unit conditions following a power on. Normally, seek-initiated status sets, following a seek command, and clears at seek-end time.

This command allows two CPUs to share drives, using the following software operation example.

DRIVE REQUEST

FORMAT: OUTPUT
FUNCTION CODE: 1



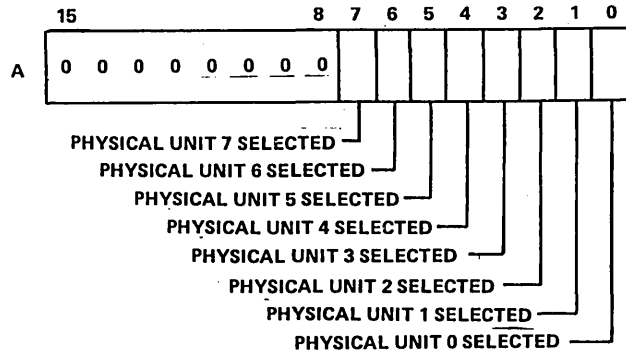
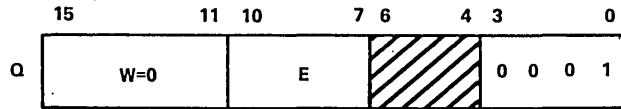
Through an initiate poll command, the requesting CPU determines that the drive it wants is busy performing a seek for the controlling CPU. (The seek-initiated status bit is set and the source usage bit is set to the other drive adapter number.) The requesting CPU executes a drive request command with A04 equal to 1 (initiate request) and waits for the controlling CPU to release the drive.

Before the controlling CPU initiates a write or read operation, it polls the drive and finds the request flag from the alternate CPU set. Prior to starting the data-transfer operation, the controlling CPU, through use of a director function (code 8), interrupts the requesting drive adapter. The controlling CPU does not initiate any new operations after completing the data transfer. Prior to exiting, it sets the drive request bit if it wants the drive back. The request bit is cleared if it does not want the drive back. Each drive request must be done on a per-drive basis.

The drive adapter accepts the command only if it is not busy and the control unit is selected. The drive request command does not select the drive; it flags a request to the alternate drive adapter, via the control unit, for a drive that is currently in use. The drive request and poll commands must be used by both CPUs for determining channel and disk drive activity.

PHYSICAL UNIT NUMBER

FORMAT: INPUT
FUNCTION CODE: 1



The physical unit number command is used by the CPU to cross reference logical drive numbers with physical drive numbers.

One bit is set in A-register bits 0 through 7 corresponding to the physical drive number of the logical drive unit currently selected.

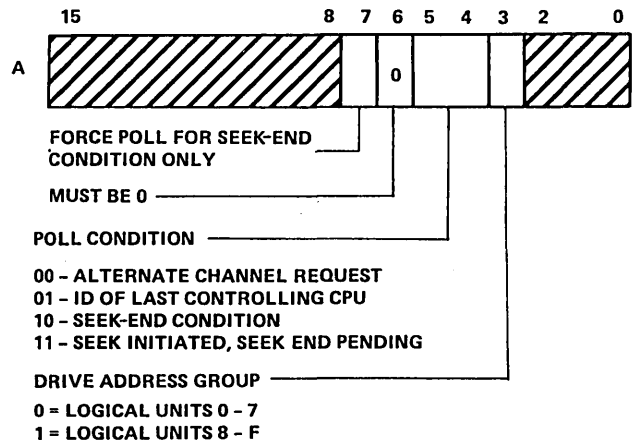
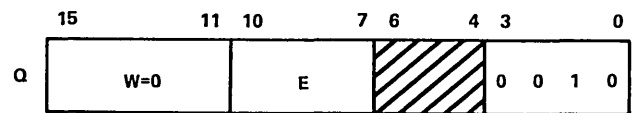
Logical addresses are assigned initially to each drive either by the insertion of a logical address plug or by setting logical address switches, applicable to MMD. Software can cross-reference logical drive numbers against physical drive numbers by first executing drive unit select (select logical unit) command (code 3) to one drive. Executing a physical unit number command causes the physical unit number of that drive to be input to its corresponding A-register bit. This can be used within the operating system for error reporting when it is more desirable to log errors by physical drive number.

NOTE

The drive adapter/control unit is designed to interface a maximum of eight drives. The drives can have logical addresses assigned by a manually inserted logic plug or switch setting anywhere within the range of 0 to F hexadecimal.

INITIATE POLL

FORMAT: OUTPUT
FUNCTION CODE: 2



The initiate poll command interrogates the control unit poll table for the requested condition.

This command causes a poll command to the control unit. A-register bit 3 specifies the group of drives being polled, and bits 4 and 5 specify one of four possible poll conditions. (See the Poll Status subheading below.)

The bit 7 force poll is used only when the CPU does not deselect the control unit following a load address (seek) command. This bit causes the control unit to poll the specified group (per bit 3) of eight drives for seek-end conditions, only and update its internal poll table. When bit 7 is set, bits 4 and 5 have no meaning.

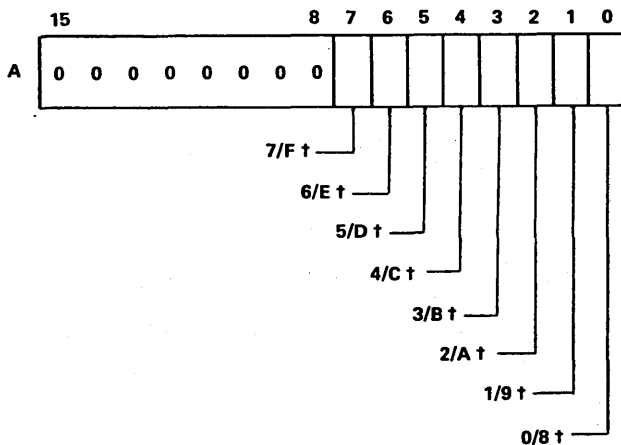
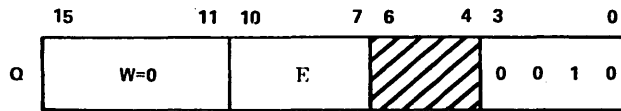
This command is used to determine channel availability and drive activity in dual-CPU configurations where time-sharing of drives between CPUs must be contended with through software. In single CPU with multiple drive configurations, this command allows the software to discriminate seek-end conditions occurring from more than one drive.

The drive adapter accepts this command if the control unit is selected and the drive adapter is not busy. Acceptance of this command causes the drive adapter to become busy and remain busy until the poll status is available (40 microseconds nominal).

After a poll, the initial drive unit selection is lost and must be reestablished via the unit select function.

POLL STATUS

FORMAT: INPUT
FUNCTION CODE: 2



† DRIVE UNIT NUMBERS AND A-REGISTER POLL BIT ASSIGNMENTS

The poll status command inputs the selected drive's operational condition in response to the poll function.

The group of drives selected by the poll function sets the assigned A-register bits to 1, if they satisfy the polled condition. The initiate poll command specifies drives 0 through 7 or drives 8 through F. For either case, their respective poll status is returned in A-register bits 0 through 7.

The following are poll response conditions:

- Controlling CPU ID (source usage)-If the respective drive A-register bit in the returned poll status is 1, this drive is selected last by drive adapter 1. If the assigned A-register bit is a 0, the drive is selected by drive adapter 0.
- Alternate channel request -If the assigned drive A-register bit position of the poll status is set, it indicates a request for that drive from the alternate-drive adapter.

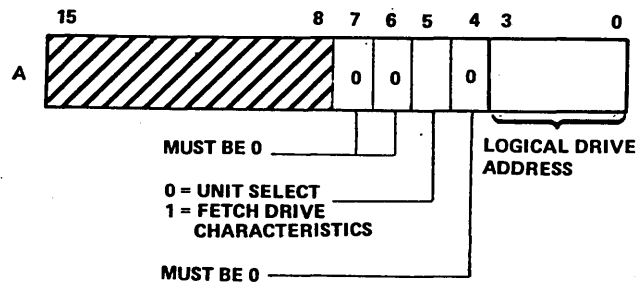
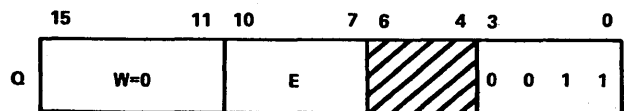
- Seek-end condition -If the respective drive A-register bit in the poll status is set, it indicates that this drive has completed a previously requested seek operation.
- Seek initiated - When the assigned A-register bit is set, it indicates that this drive is currently executing a requested seek operation.

The poll status determines the channel and drive activity in a dual-CPU configuration (see Initiate Poll).

An initiate poll output command must precede a poll status input command. If other intervening operations are performed, requested information may be lost.

UNIT SELECT

FORMAT: OUTPUT
FUNCTION CODE: 3



The unit select command selects the logical unit number.

A-register bits 0 through 3 are used to select logical drives 0 through F (hexadecimal). Executing this output function causes one of the following conditions to occur:

- If the control unit is already selected by this drive adapter, the drive adapter selects the drive specified by this command and select acknowledge status can be read.
- If the control unit is not already selected by this drive adapter, the drive adapter initiates a control unit select sequence only. A second unit select function is then required to obtain control of the desired drive. The drive adapter may remain busy for up to 50 microseconds.

- If the control unit is currently selected by the alternate channel, the drive adapter performs a select sequence of the control unit only after the control unit is released by the alternate channel. The drive adapter remains busy until the control unit becomes selected.
- If the control unit is already selected by this drive adapter and bit 5 in the A register is set to 1, then the drive adapter fetches the drive characteristics from the drive specified in bits 0 through 3. The drive characteristics information is held in the control unit and must be immediately brought into the A register with a drive characteristics status command (MMD only) if the information is to be retained.

Following completion of the select, the selected status is set and the selected interrupt is activated if it has been enabled previously.

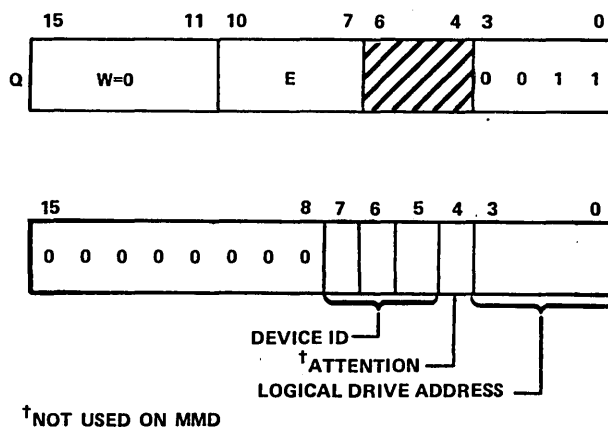
This command provides software with the capability of direct selection of logical drive units in a single-CPU configuration. For dual-CPU/drive adapter configurations, see the Drive Request subheading (output function code 1).

This command should be followed by a select acknowledge status input command.

Although the control unit system supports a maximum of eight physical drives, they can be assigned any logical addresses of 0 through F (hexadecimal) as determined by their logical address plug (LAP) or switches.

SELECT ACKNOWLEDGE STATUS

FORMAT: INPUT
FUNCTION CODE: 3



The select acknowledge status command allows the CPU to verify drive selection and determine drive unit characteristics.

This status should be read following a unit select command and preceding any other I/O command; otherwise the status may be lost in the drive adapter.

Logical Drive Address

A-register bits 0 through 3 indicate the disk logical address that responds to the unit select command. The CPU program checks that these bits agree with the address that is output as part of the unit select command.

Attention

A-register bit 4 equal to 1 indicates that the heads are unloaded and reloaded on the selected drive as a result of a pack change or a fault condition. When the drive comes ready, attention stays set until reset by the clear attention command (code C). This bit is not used on the MMD.

Device ID

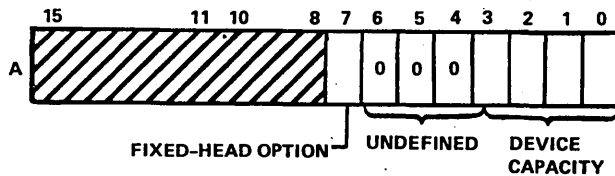
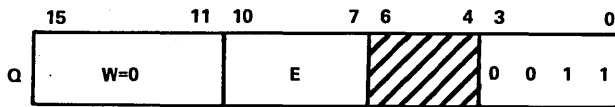
A-register bits 5 through 7 indicate the disk drive identification, according to drive density, as defined in table 2-6.

TABLE 2-6. DEVICE CAPACITY IDENTIFICATION

Device	A07	A06	A05
40 megabyte storage module drive	0	0	0
80 megabyte storage module drive	1	0	0
150 megabyte storage module drive	0	1	0
300 megabyte storage module drive	1	1	0
Mini-module drive	0	0	1

DRIVE CHARACTERISTICS STATUS (MMD ONLY)

FORMAT: INPUT
FUNCTION CODE: 3



The drive characteristics status command allows the CPU to verify drive-capacity and fixed-head option. This status is read, following a unit select command that is sent with bit 5, in the A register set to a 1 and should precede any other I/O command; otherwise the status is lost. The drive characteristics status is only meaningful when the drive is a mini-module drive (MMD).

Device Capacity

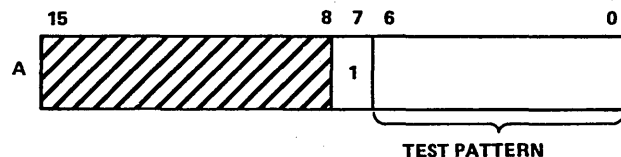
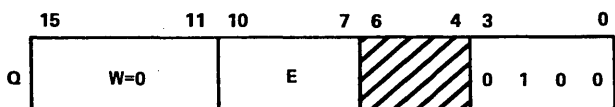
When A-register bits 0 through 3 are all 0, the mini-module drive capacity is 12 megabytes. When A-register bits 1, 2, and 3 are all 0 and bit 0 is equal to 1, the MMD capacity is 24 megabytes.

Fixed-Head Option

A-register bit 7 equal to 1 indicates the presence of the fixed head option in the MMD.

DRIVE ECHO OUTPUT DATA

FORMAT: OUTPUT
FUNCTION CODE: 4

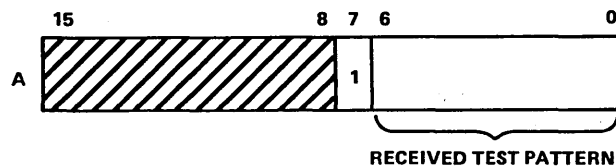
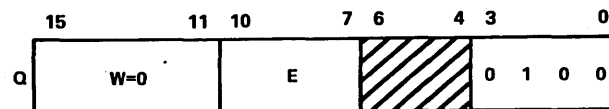


The drive echo output data command is used to output a test pattern to the selected drive unit. This command is a diagnostic aid that allows the CPU to verify the BUSOUT and BUSIN data paths between the control unit and the drive. A-register bit 7 must be a 1 and bits 0 through 6 are any binary data pattern. The data that is output via this command is input and verified by the drive echo input command.

This command, in conjunction with the corresponding input command, provides a functional verification of the command, status, and data paths between the drive adapter, the control unit, and the selected drive.

DRIVE ECHO INPUT DATA

FORMAT: INPUT
FUNCTION CODE: 4



The drive echo input data command is used to read back the test pattern to A-register bits 0 through 7.

This command allows the CPU to input the binary data pattern that was output to the drive via the drive echo output data command and is a diagnostic test of the control unit/drive data paths.

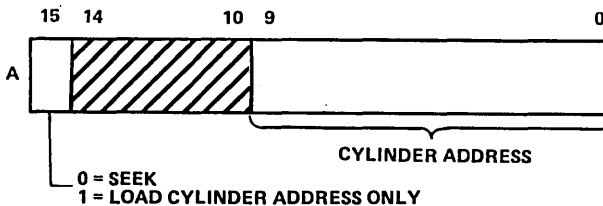
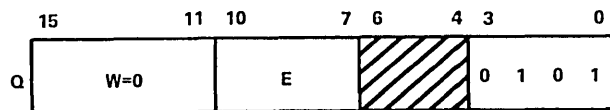
When used in conjunction with the drive echo output data command, this command allows full echo checking of the command, status, and data paths between the drive adapter, the control unit, and the selected drive.

NOTE

The input data is meaningful only when this command is immediately preceded by the drive echo output data command.

SEEK/LOAD CYLINDER ADDRESS

FORMAT: OUTPUT
FUNCTION CODE: 5



Seek

A seek command loads the cylinder address register and initiates a seek when A-register bit 15 is equal to 0.

The cylinder address register in the drive adapter is loaded from A-register bits 0 through 9. A seek command to that address is then issued to the selected drive.

The seek positions the selected drive's head to the desired cylinder address in preparation for track and sector selection. Absolute addressing is used.

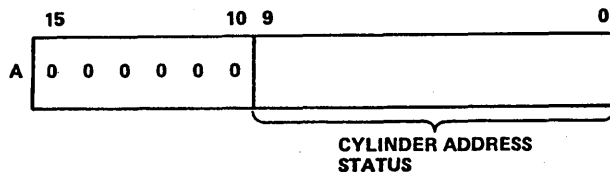
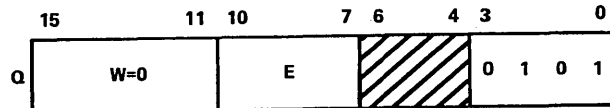
Load Cylinder Address

When A-register bit 15 is equal to 1, this command is used to load the cylinder address into temporary storage. This is subsequently used in comparing correct information in the address field.

The load cylinder address is considered part of the DMA read or write sequence and not part of the seek operation.

CYLINDER ADDRESS STATUS

FORMAT: INPUT
FUNCTION CODE: 5



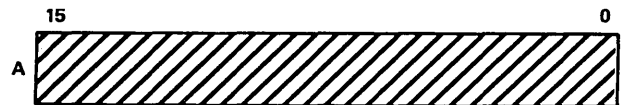
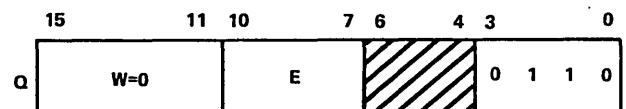
The cylinder address status command inputs the cylinder address register contents to A-register bits 0 through 9.

Following a load cylinder address command, the cylinder address status is the same as the address that is issued by that function regardless of the true cylinder address of the current selected drive. Following a return-to-zero (RTZ) seek function, the cylinder address status is set to 0.

Care must be taken when attempting to determine the true cylinder address status of a drive. This is particularly true when doing overlapped seek operations. Following a series of load address commands to different drives, the cylinder address register contains the same information that is issued as part of the last-seek function. For this case, one way to determine a drive's current cylinder address is to initiate a read address function and then compare the information transmitted to memory with the expected address. Another method is to initiate the desired read data command and then check the cylinder address status at its completion.

FORMAT WRITE

FORMAT: OUTPUT
FUNCTION CODE: 6



The format write command erases a select track.

This command causes the control unit to write 0's beginning at the index mark of the previously specified track. The format write operation is terminated upon detection of the next index mark.

No data is transferred between the CPU and the drive. The format write command is a one-track operation, and upon completion, the drive adapter clears the busy status bit and sets the transfer complete status.

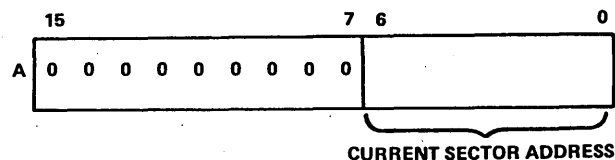
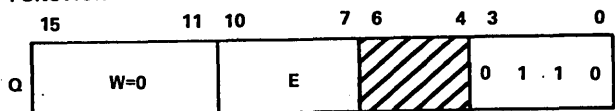
This command is required for pack initialization and setting up the proper head gaps and synchronous patterns.

NOTE

A format write destroys any data or address information previously recorded on the track.

CURRENT SECTOR STATUS

FORMAT: INPUT
FUNCTION CODE: 6



The current sector status command inputs the current physical sector number.

This input command causes the number of the current physical sector under the read/write heads of the selected drive to be input to the CPU A register.

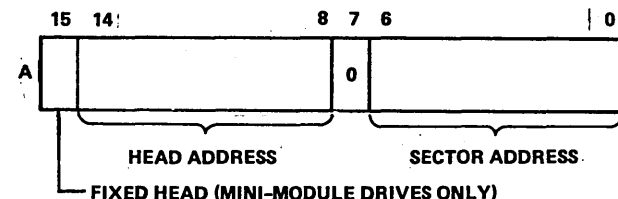
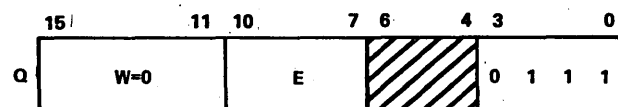
The current sector status allows software to perform rotational position sensing.

NOTE

Sectors are numbered consecutively from 0 to N beginning at the index mark. N is 1 less than the total number of sectors (dependent upon the sector plug installed in the drive) per track, (for example, 64 sectors numbered as sectors 0 through 63).

SECTOR AND HEAD ADDRESS

FORMAT: OUTPUT
FUNCTION CODE: 7



The sector and head address command loads the drive adapter sector/head address register.

The desired sector number (maximum of 128) is set in A-register bits 0 through 6 along with the head address in A-register bits 8 through 15. Upon execution, a head select command is issued to the selected drive.

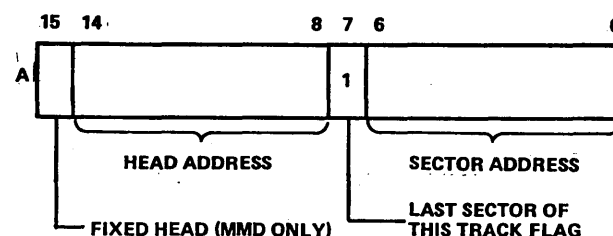
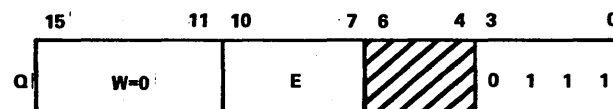
This function, preceded by a seek/load cylinder address command (code 5), provides electronic positioning of the selected drive's head for a specific track and sector access. A DMA read or write data operation is then initiated.

Selection of the sector and head address is considered part of the DMA read or write operation and not part of the seek operation.

For DMA read address or write address commands, the sector address field in the A register is ignored since the data transfer always starts from the index mark that precedes physical sector number 0.

SECTOR AND HEAD STATUS

FORMAT: INPUT
FUNCTION CODE: 7



The sector-and-head status input command causes the sector-and-head address status to be input to the CPU A register as shown above. Following a sector-and-head output command, the sector-and-head status is the same as that issued as part of the output command. Following an RTZ-seek function, the sector and head status is set to 0.

If bit 7 of this status word equals a 1, this sector is the last logical sector of the track. This is established by software at the time the track is originally formatted with a write address command.

Following completion of the read or write data operation or the occurrence of any error causing termination, this status represents the last head and actual physical sector address operated in. The drive adapter accepts this command if it is not busy and the control unit is selected.

DIRECTOR FUNCTION

The director function command sets up the interrupt mask in the drive adapter and provides channel control to the control unit per A-register bits 6 through 9 (see also figure 2-1).

Clear Drive Adapter

The A00 = 1 function bit clears all controls, interrupt requests, interrupt responses, and alarm conditions within the drive adapter. The control unit is deselected.

Clear Interrupts/Enables

The A01 = 1 function bit clears all interrupts, resets the interrupt mask register, and disables all further interrupts.

Interrupt Condition Selector Code

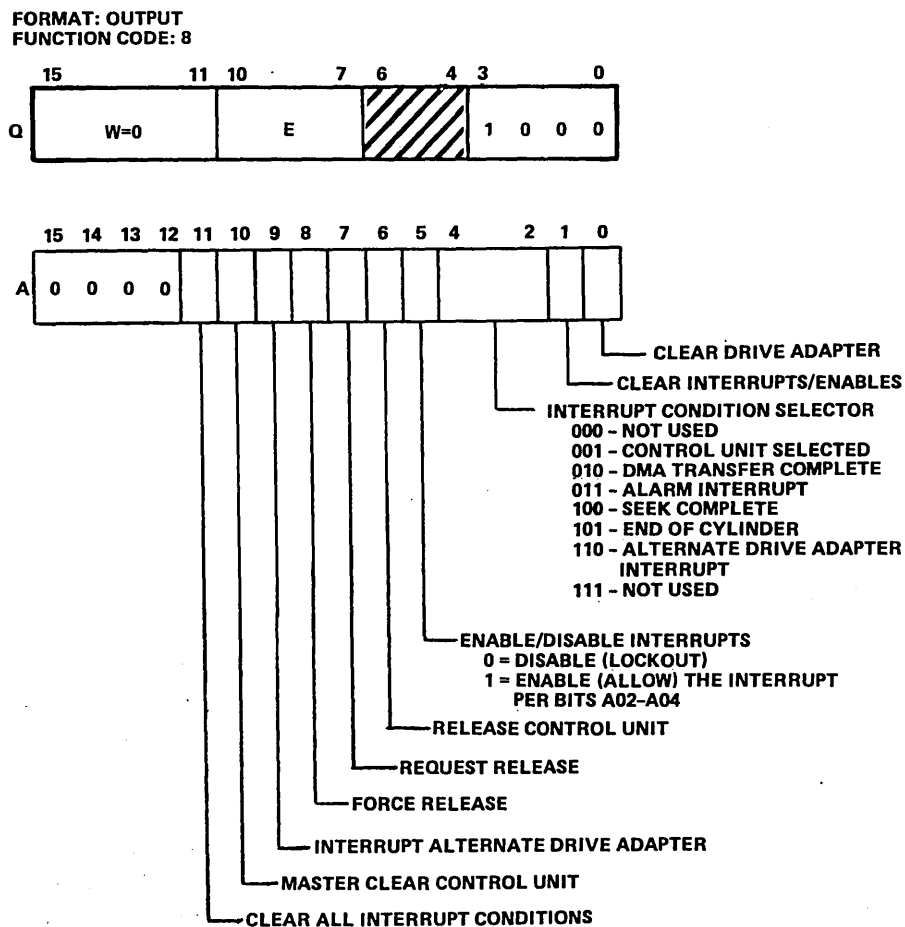
All subsystem conditions that result in the generation of an interrupt to the CPU are selectively enabled or disabled. Each interrupt condition is individually selected, as required, by the following codes placed in A-register bits 2 through 4 and accompanied by an A/Q director function command.

NOTE

A clear drive adapter function (A00 = 1) or a clear interrupt function (A01 = 1) disables all the conditions from causing interrupts but still allows the condition to set its respective status bit.

The list of codes is as follows:

- A02 through A04 = 001 - When the control unit is selected, this interrupt enable allows an interrupt to the CPU whenever the control unit is first selected by this drive adapter.
- A02 through A04 = 010 - When the DMA transfer is complete, this interrupt enable allows the drive to generate an interrupt to the CPU when it has completed a data transfer with the selected drive for a read data, write data, read address, write address, format write, or ECC check operation.
- A02 through A04 = 011 - The alarm interrupt enable allows an interrupt to the CPU when any alarm condition exists. Refer to Alarm Conditions at the end of this section.



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Figure 2-1. Director Function Registers

- A02 through A04 = 100 - The seek-complete interrupt enable allows an interrupt to the CPU when any one of the drives selected by this drive adapter has completed a seek operation. A seek-end condition occurs for every seek function, RTZ-seek function, or head position offset function.
- A02 through A04 = 101 - The end-of-cylinder interrupt enable allows an interrupt to the CPU when a data or address read or write operation attempts an access beyond the last sector of the last track on the selected drive.
- A02 through A04 = 110 - The alternate drive adapter interrupt enable allows the drive adapter to generate an interrupt when it is interrupted by the alternate drive in a dual-CPU configuration.

Enable/Disable Interrupts

If A-register bit 5 equals 1, the drive adapter is allowed to interrupt the CPU for the condition selected by bits A02 through A04. If A-register bit 5 equals 0, the interrupt (as selected by A02 through A04) is disabled.

Release Control Unit

A-register bit 6 equal to 1 causes the drive adapter to disconnect from the control unit, thereby allowing the alternate channel to gain access or to allow the control unit to poll for seek-end conditions.

Request Release

A-register bit 7 equal to 1 causes the control unit request status bit to be set in the alternate channel's control unit status word. It is used to request the alternate channel to release the control unit.

Force Release

A-register bit 8 equal to 1 forces the alternate drive adapter to unconditionally release control of the disk subsystem. If a data transfer is in progress, it is terminated as soon as the control unit recognizes the force release operation. The control unit may be selected by this drive adapter if a unit select command is first issued.

This function bit must be used cautiously because the termination of the alternate channel is not well controlled. The primary application of this function bit is to force the alternate channel to release when it is determined that the alternate drive adapter is otherwise unwilling or unable to release due to some error condition or hardware failure.

Interrupt Alternate Drive Adapter

A-register bit 9 equal to 1 causes the drive adapter to generate an interrupt signal to the alternate drive adapter in a dual-CPU configuration.

Master Clear Control Unit

A-register bit 10 equal to 1 causes the control unit to be master cleared. This function must be used carefully as any polling information may be lost. This function is intended as a last try error recovery technique only.

NOTE

The control unit must not be selected by either drive adapter for this function to operate.

Clear All Interrupt Conditions

A-register bit 11 equal to 1 causes all interrupting conditions within the drive adapter to be cleared. This function does not change the state of the interrupt enables.

A-register bits 12 through 15 are not used with the director function command.

The drive adapter accepts a director function command at any time.

DRIVE ADAPTER STATUS

The drive adapter status command transfers the status word in the drive adapter to the A register. (See also figure 2-2.)

Busy

A-register bit 0 equal to 1 indicates that the drive adapter is presently involved in the performance of a previously requested operation. The busy status is set when the drive adapter accepts any read or write operation, a format write command, a seek command, or an initiate poll command. Busy is cleared when the operation is completed, no longer involves the drive adapter, or an abnormal condition is detected that aborts the operation. Busy is also cleared by a clear drive adapter command (director function command and A-register bit 0 equals 1). (Refer to the Programming Aids and Considerations subheadings at the end of this section for additional information on drive adapter busy status.)

Interrupt Active

A-register bit 1 equal to 1 indicates that a selected interrupt condition has occurred. Status bits A02 through A07 define the interrupt that occurred. The interrupt status bit is cleared by a clear drive adapter or clear interrupt condition or by disabling the interrupt enable.

Control Unit Selected

A-register status bit 2 equal to 1 indicates that the control unit is currently selected by this drive adapter. It is set following completion of the control unit select sequence. This bit is cleared by a clear drive adapter

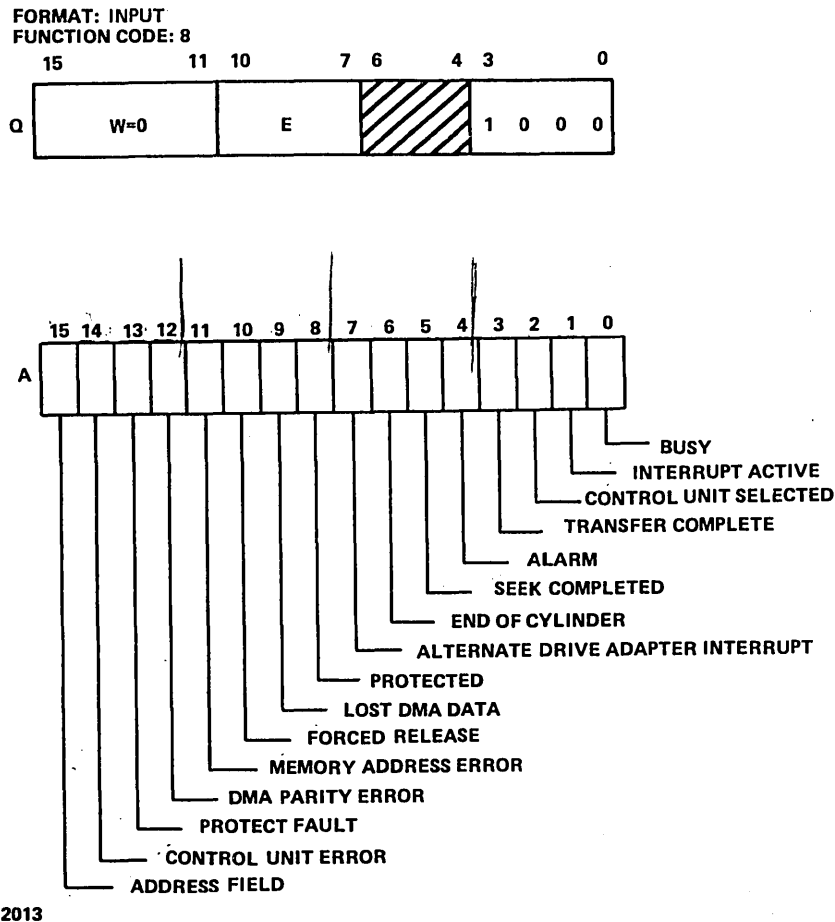


Figure 2-2. Drive Adapter Status Registers

command, a release command (director function and A-register bit 0 or 6 equals 1), or a force release from the alternate drive adapter.

Transfer Complete

A-register status bit 3 equal to 1 indicates that the drive adapter has completed a format write, read data, write data, read address, write address, or read check operation. Setting this bit coincides with clearing of busy status. The transfer complete status bit is cleared by a clear drive adapter, clear interrupt director function, clear interrupt conditions, or another read or write command.

Alarm

A-register status bit 4 equal to 1 indicates that one or more of the following abnormal conditions have been detected by the drive adapter:

- Lost DMA data
- Force release

- Memory address error
- DMA parity error
- Protect fault
- Control unit error

The error condition detected is indicated by A-register status bits 9 through 14. The alarm status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Seek Completed

A-register status bit 5 equal to 1 indicates that one or more drives has completed a seek operation that was requested from this drive adapter. Following a seek-complete condition, the CPU initiates a polling operation to determine which drive or drives has/have completed a seek. The seek-completed status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

End of Cylinder

A-register status bit 6 equal to 1 indicates that the data or address read or write operation has been suspended because it extends beyond the last track of the current cylinder on the selected drive. When the drive adapter detects this condition, the data transfer is terminated and the busy status is cleared. Since the buffer length register (word count) does not equal 0, the transfer complete status bit is not set. In order to continue the information transfer, cylinder boundaries must be crossed. This can be accomplished by issuing a seek command. After repositioning the heads to the next cylinder address and setting the desired sector and head address, another read or write command is issued. The end-of-cylinder status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Alternate Drive Adapter Interrupt

A-register status bit 7 equal to 1 indicates that the drive is interrupted by the other drive adapter in a dual-CPU configuration. This status is only true if this interrupt is enabled prior to receiving the interrupt signal from the other drive adapter. The alternate drive adapter interrupt status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Protected

A-register status bit 8 equal to 1 indicates that the drive adapter program protect jumper is in and is, therefore, operating in a protected mode.

Lost DMA Data

A-register status bit 9 equal to 1 indicates that the DMA channel of the CPU is unable to keep up with the information transfer rate of the control unit and disk drive. Detection of this error causes the read or write operation to terminate at the end of the current sector. The lost data status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Forced Release

A-register status bit 10 equal to 1 indicates that the alternate channel has executed a forced release function. The force release function causes this drive adapter to disconnect from the control unit, allowing the alternate channel to gain access. Any operation in progress is terminated immediately. The forced release status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Memory Address Error

A-register status bit 11 equal to 1 indicates that the drive adapter has attempted to address a nonexistent CPU memory location (that is, beyond the system memory available) during a read or write data or address operation. Detection of this error causes the read or write operation to terminate at the end of the current sector. The memory-address error status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

DMA Parity Error

A-register status bit 12 equal to 1 indicates that the drive adapter has received a parity error signal from the CPU direct memory access channel. Detection of this error causes the operation to terminate at the end of the sector being operated on. The DMA parity error status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupt director function.

Protect Fault

A-register status bit 13 equal to 1 indicates that an unprotected write to memory operation attempted to write into a protected CPU memory location. The memory inhibits the attempted write. This error causes the operation to terminate at the end of the sector being operated on. The protected fault status bit is cleared by a clear drive adapter, clear interrupt conditions, or clear interrupts director function.

Control Unit Error

A-register status bit 14 equal to 1 indicates that the drive adapter has detected an abnormal condition during a command sequence or with an information transfer. To determine the error condition, the CPU must read the drive adapter and/or control unit status word. The control unit error status bit will be set (with control unit status word equal to 0) for the following conditions:

- Parity error received on BUSIN.
- Requested record not found. The drive adapter was unable to find the requested sector, head, or cylinder address.

The CPU must read the drive adapter file to determine the error condition (compare target versus actual).
- Sequence time out. No response from the control unit within the required time period.
- Drive adapter test mode error. The drive adapter was unable to complete a test mode data transfer, via DMA, within the required 154-microsecond time-out period.
- Bad sector flag detected. The drive adapter found the bad sector flag set in the address field. The CPU must read the drive adapter file to determine the error condition and the alternate cylinder, head, and sector address from the flag bytes.

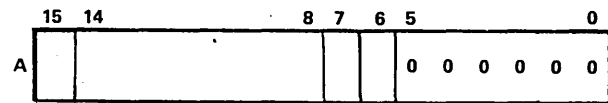
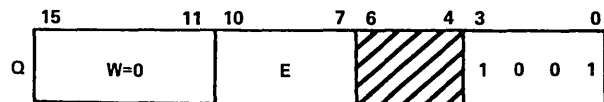
Address Field

When the drive adapter is performing a read or write operation, A-register bit 15 equal to 1 indicates that the drive adapter is currently operating in the address field of a sector. For other operations, or when the drive adapter is not busy, this bit indicates that the last drive adapter read or write operation was performed on the sector address field. This bit is cleared by a drive adapter director function or upon acceptance of a format write, write data, or read data operation.

The drive adapter accepts a drive adapter status function command at any time.

INITIATE READ

FORMAT: OUTPUT
FUNCTION CODE: 9



NUMBER OF HEADS PER CYLINDER

40 & 80 MEGABYTE = HEX 00 OR 05

300 MEGABYTE = HEX 13

MMD

MOVEABLE HEAD = HEX 04

FIXED HEAD = HEX B0

1 = ECC CHECK
0 = NORMAL READ

1 = READ ADDRESS
0 = READ DATA

The initiate read command causes the drive adapter to initiate an information transfer from the selected drive to CPU memory if the buffer length register contents are initially nonzero. The actual information to be read is determined by A-register bits 6 and 7.

In the case of a read address function (A07 = 1), the drive adapter reads the first five words (address field) per physical sector beginning at the index mark of the previously specified track. The total number of address fields that is read is a function of the buffer length register contents.

For a read data function (A07 = 0), the number of data words within a sector is determined by the drive adapter from the field length bytes in the address field of that sector. The transfer begins at the previously specified cylinder, head, and logical sector address.

Previously, the buffer length register was loaded with a nonzero word length by the set data buffer length command, and the first word address was loaded by the set FWA, lower and upper commands. When the data transfer begins, the FWA is incremented in the current word address register, and the buffer length register is decremented as each word is transferred to the CPU memory.

When the buffer length register finally equals 0, the drive adapter ends the information transfer to CPU memory; clears the busy status; and sets the transfer complete, interrupt, and status bit. If the data or address information transfer ends within a sector, the drive adapter continues reading to the end of the sector. The control unit then determines if the ECC word is correct. If the transfer extends beyond the last sector in a cylinder, the drive adapter suspends the data transfer, clears the busy status, sets the end-of-cylinder status bit, and if allowed, interrupts the CPU. The program continues the data transfer by repositioning the heads, setting the desired sector and head address, and issuing another DMA read command. If information transfer is

attempted beyond the last cylinder in a file, a drive seek error occurs.

For an ECC check (A06 = 1) the drive adapter executes a read operation as described above except that no data is transferred to memory. This is intended to be used as a read-after-write ECC check for applications where a check for ECC errors is a requirement. The system software must then determine if the ECC error is correctable or noncorrectable.

The drive adapter accepts this function if it is not busy, and the control unit is selected.

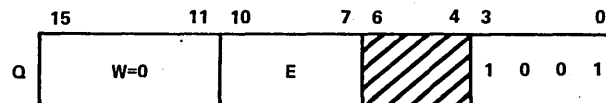
The drive adapter becomes busy upon acceptance of this function and remains busy until either the end of the last sector operated on is detected, the end-of-cylinder condition is detected, or an alarm condition is detected.

NOTE

A read operation may be as small as one CPU word or as large as one cylinder, depending on the specified buffer length and the starting head and sector address. Refer to the Alarm Conditions subheadings at the end of this section for additional information related to this function.

TEST MODE READ

FORMAT: OUTPUT
FUNCTION CODE: 9-1



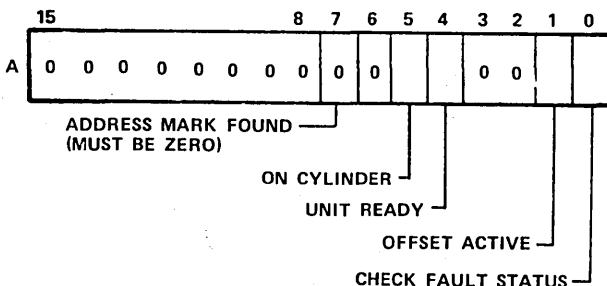
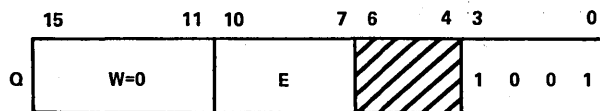
The test mode read command writes the drive adapter 64-word buffer into the CPU memory.

Any DMA read function initiated with the buffer length register containing 0 causes the drive adapter to transmit the 64 words stored in its FIFO buffer memory to the CPU memory starting at the address specified by the first word address register. Effectively, this operation causes the drive adapter to echo back the 64 data words read from memory by a test mode write command. When the transfer is complete, the busy status is cleared and the transfer complete status is set.

A test mode write operation must precede a test mode read operation. If other operations are performed between a test mode write/read sequence, the data contained in the drive adapter FIFO can be lost.

DRIVE STATUS WORD 2

FORMAT: INPUT
FUNCTION CODE: 9



The drive status word 2 command inputs the currently selected drive operational status to the CPU A register and allows a quick program check of that drive's conditions.

Check Fault Status

A-register bit 0 equal to 1 indicates that there is at least one bit set in the drive fault status word.

Offset Active

A-register bit 1 equal to 1 indicates that the head position is offset, plus or minus, from the nominal head position on the currently selected drive. Write operations are not permitted on drive units with heads in an offset condition.

Unit Ready

A-register bit 4 equal to 1 indicates that the drive is up to speed, the heads are loaded, and no fault condition exists within the module drive.

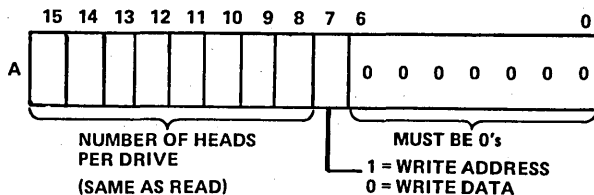
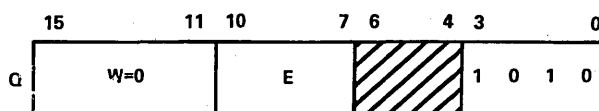
On Cylinder

A-register bit 5 equal to 1 indicates that the heads are stationary (that is, not seeking) at the previously specified cylinder address.

This status is valid any time following the unit select command and provided the drive adapter is not busy.

INITIATE WRITE

FORMAT: OUTPUT
FUNCTION CODE: A



The initiate write command causes the drive adapter to initiate an information transfer to the selected drive if the drive adapter buffer length register contents are initially nonzero. The type of information to be written on the disk is determined by A-register bit 7.

In the case of a write address function (A07 = 1), the drive adapter writes five words (from CPU memory) per physical sector beginning at the index mark of the previously specified track.

For a write data function (A07 = 0), the number of words written per sector (from CPU memory) is determined by the drive adapter from the field length bytes in the address field of that sector.

The total words transferred to disk from memory for write address or data operations is a function of the buffer length register contents. The transfer begins at the previously specified cylinder, head, and sector address.

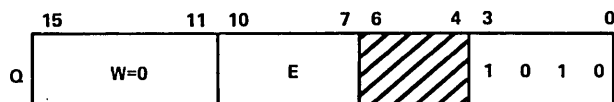
The write address and write data commands operate in basically the same manner as the read address and read data commands. The principle difference is that if the information transfer ends within the address or data field of a sector, the drive adapter fills the remainder of the address or data field with 0's. The control unit then writes the seven ECC bytes.

The drive adapter accepts this command only if it is not busy and the control unit is currently selected. A write operation may be as small as one CPU word or as large as one cylinder depending on the specified buffer length and the starting head and sector address.

Additional information relating to the DMA write function is contained under Alarm Conditions and under Programming Aids and Considerations at the end of this section.

TEST MODE WRITE

FORMAT: OUTPUT
FUNCTION CODE: A-1



The test mode write command loads the drive adapters 64-word FIFO buffer from the CPU memory.

Any DMA write function with the buffer length specified as 0 causes the drive adapter to transfer 64 words from CPU memory starting at the address specified by the current word address register. When this transfer is complete, the drive adapter busy status is cleared and the transfer complete status is set. Data is not transferred to the control unit during this operation.

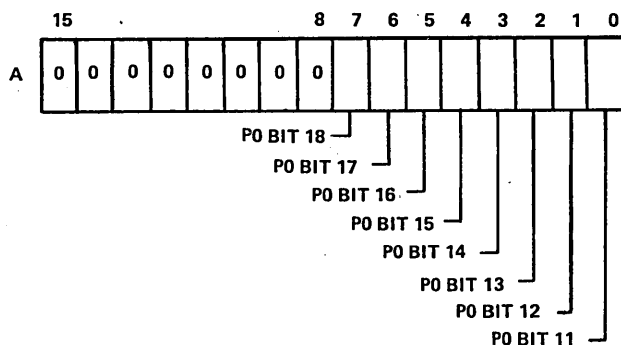
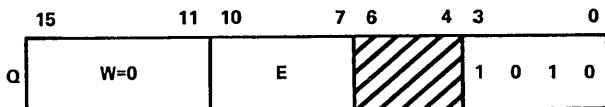
The program checks the input data against the output through execution of a test mode read command and checks several error conditions through sampling interrupts and status.

NOTE

Between the test mode write and read commands, a clear drive adapter director function command must not be issued because it causes the data in the FIFO buffer memory to be destroyed.

ERROR CORRECTION CODE PATTERN

FORMAT: INPUT
FUNCTION CODE: A



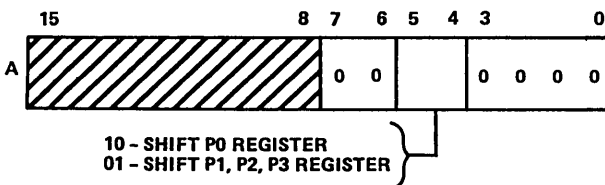
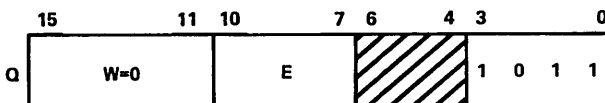
The ECC pattern command inputs the ECC pattern (error burst) from the control unit P0-register bits 11 through 18 to A-register bits 0 through 7.

Following detection of an ECC condition in control unit status, this command is used as part of the software error correction routine for possible correction of disk read data. Refer to the control/unit hardware maintenance manual for additional information.

The drive adapter accepts this command if it is not busy and the control unit is currently selected.

ECC CONTROL

FORMAT: OUTPUT
FUNCTION CODE: B



The ECC control command causes the control unit to shift its ECC polynomial registers as defined by A-register bits 4 and 5.

Upon detection of an ECC error, this command is used as part of the software error correction algorithm to determine the error position within the data stream. Refer to the control/formatter unit hardware maintenance manual for additional information.

The drive adapter accepts this command if it is not busy and the control unit is currently selected.

ECC CONDITION STATUS

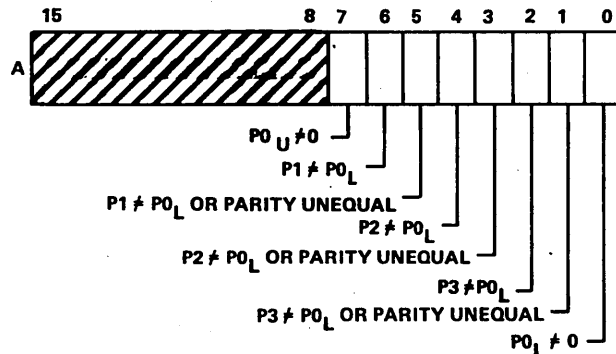
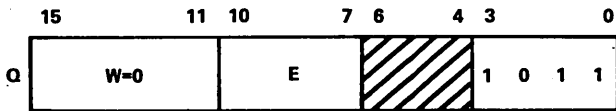
The ECC condition status command inputs the ECC polynomial register relationships to the A register.

This input command causes the ECC condition status to be input to the CPU A register. The control unit P0 lower register (bits 0 through 10) is compared against the P1, P2, and P3 registers for a zero or nonzero condition. The results of that comparison are reflected in A-register bits 0 through 7.

Upon detection of an ECC error, the software error correction algorithm uses this input function following polynomial register manipulation.

The drive adapter accepts this command if it is not busy and the control unit is currently selected.

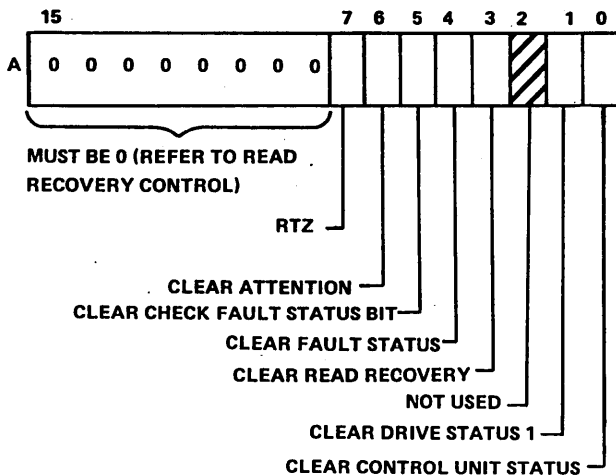
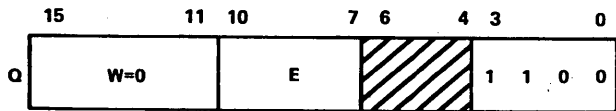
**FORMAT: INPUT
FUNCTION CODE: B**



STATUS CLEAR CONTROL

The status clear control command is used to clear status words and conditions.

**FORMAT: OUTPUT
FUNCTION CODE: C**



Clear Control Unit Status

A-register bit 0 equal to 1 causes the control unit status to be reset to 0.

Clear Drive Status 1

A-register bit 1 equal to 1 causes drive status 1 to be reset to 0.

Clear Read Recovery

A-register bit 3 equal to 1 causes the head position offset and timing strobe early/late conditions to be reset to their normal values. This function does not generate a seek-end condition when clearing offsets.

Clear Fault Status

A-register bit 4 equal to 1 causes the drive fault status word to be reset to 0.

Clear Check Fault Status Bit

A-register bit 5 equal to 1 causes the check fault status bit within drive status 1 and 2 to be reset.

Clear Attention

A-register bit 6 equal to 1 causes the attention bit in select acknowledge status to be reset.

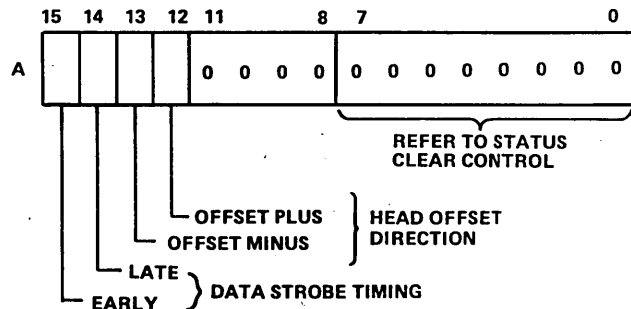
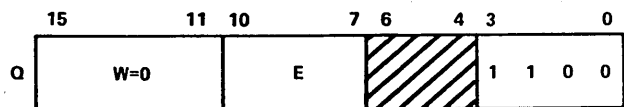
Return to 0

A-register bit 7 equal to 1 is used to command RTZ seek on the selected drive. Additionally, the cylinder, head, and sector address registers within the drive adapter, and any drive offset conditions are cleared.

The drive adapter accepts this command if it is not busy and the control unit is currently selected.

READ RECOVERY CONTROL

**FORMAT: OUTPUT
FUNCTION CODE: C-1**



The read recovery control command allows software control of the drive head position offset and read timing strobe as defined by A-register bits 12 to 15. If any of these control bits are set, the lower 12 bits of the A register are ignored.

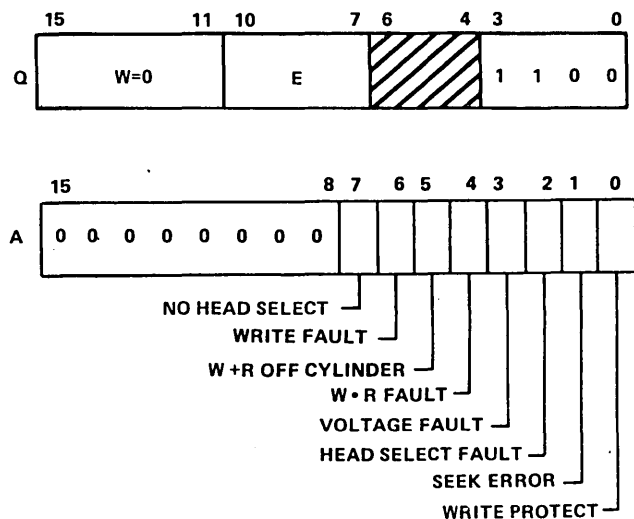
The offset and timing conditions that are maintained within the drive unit may be altered via this command. They are cleared via bit A03 of the status control function or until any seek operation is initiated.

The read recovery function is intended to be an aid in recovering marginal data.

The drive adapter accepts this command if it is not busy and the control unit is currently selected. The head offset or the RTZ-seek function operate like any other seek command and result in the normal seek-end conditions at completion. A head offset results in a delay of on-cylinder and seek-end status for a period of 3.2 milliseconds maximum (2.7 millisecond nominal). The maximum time for the heads to move from forward to reverse offset, or vice versa, does not exceed 7 milliseconds. Data cannot be written while in the offset mode.

DRIVE FAULT STATUS

FORMAT: INPUT
FUNCTION CODE: C



The drive fault status command inputs the selected drive fault condition status to the A register.

Write Protect

A-register bit 0 equal to 1 indicates that the selected drive is write protected. It is set when head alignment maintenance is being performed, during fault conditions that inhibit writing or when write protection is purposely enabled on the drive.

Seek Error

A-register bit 1 equal to 1 indicates that a seek-error condition has occurred due to any of the following:

- The drive is unable to complete a head move within 500 milliseconds.
- The carriage moves to a position outside the recording field.
- A cylinder address is greater than the physical maximum for the selected drive.

A seek error can be cleared only by an RTZ command (function code C) that returns the heads to cylinder 0 and sets the on-cylinder status signal.

Head Select Fault

A-register bit 2 equal to 1 indicates that more than one head has been selected. Detection of this fault inhibits disk write operations on this drive.

Voltage Fault

A-register bit 3 equal to 1 indicates a below normal voltage is or was present for either positive or negative voltages. Detection of a voltage fault inhibits writing and generates an automatic retraction of the heads.

W • R Fault

A-register bit 4 equal to 1 indicates that the drive write gate logic is on at the same time as its read gate. Detection of this fault inhibits write operations on this drive.

W + R Off Cylinder

A-register bit 5 equal to 1 indicates that a read or write operation has been attempted, and the heads were not on cylinder. Detection of this fault inhibits write operations on this drive.

Write Fault

A-register bit 6 equal to 1 indicates the loss of write current at the heads. The circuitry employs a fault technique to detect if the head coils are shorted or open. Detection of this fault inhibits writing.

No Head Select

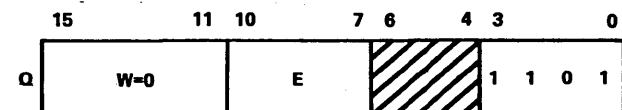
A-register bit 7 equal to 1 indicates that a head select address greater than the available number has been selected.

The program normally, upon detecting the check fault status flag in drive status 1 (bit 5) or drive status 2 (bit 0), issues this command for definitive error information.

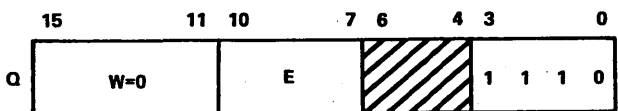
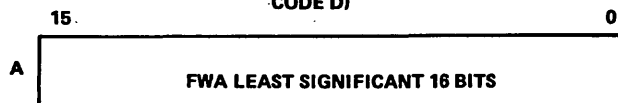
The drive adapter accepts a drive fault status input command if the control unit is selected and the drive adapter is not busy.

SET FIRST WORD ADDRESS, LOWER OR UPPER

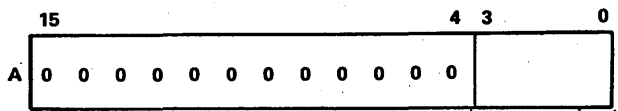
· **FORMAT: OUTPUT**
FUNCTION CODES: D AND E



**SET LOWER
(FUNCTION
CODE D)**



**SET UPPER
(FUNCTION
CODE E)**



**FIRST WORD ADDRESS MOST
SIGNIFICANT FOUR BITS**

The set first word address (FWA) command, lower or upper, loads the drive adapter current word address register with the first data word main memory address (FWA).

The A-register bits 0 through 15 (for a set lower function), and 0 through 3, for a set upper function, collectively contain the starting address in the data buffer area main memory. The set upper and lower functions cause their respective A-register bits to be output to the 20-bit current word address register in the drive adapter.

The set FWA command, lower or upper, is used to initialize the drive adapter to prepare for a DMA read/write address or data function (function codes 9 or A).

After receiving a disk read or write command, the contents of the drive adapter current word address register points to the first main memory address (FWA) where the data transfer between the disk and memory must begin.

The set FWA upper command must be used to load the current word address when accessing memory sizes above 64K (FFFF_{16}). This allows the drive adapter to directly address up to 1024K (FFFFF_{16}) of memory.

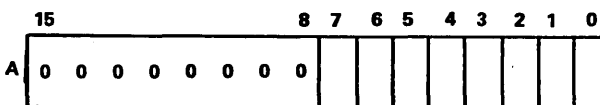
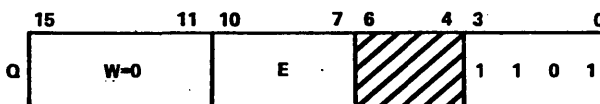
The set FWA upper command (function code E) is a dual command. The field of A-register bits 0 through 3 and 7 through 15 are used by the select file function (code E-1) to enable reading or writing into 1 of 16 file registers.

NOTE

The current word address register is set to 0 with a master clear or clear drive adapter interface function command.

CONTROL UNIT STATUS

FORMAT: INPUT
FUNCTION CODE: D



INTERFACE PARITY ERROR

DRIVE STATUS ERROR

POWER FAILURE

COMMAND SEQUENCE/OVERRUN ERROR

CONTROL UNIT EXECUTION INCOMPLETE INSTRUCTION

ECC ERROR

LOST DATA/PARITY ERROR

CONTROL UNIT REQUEST -

The control unit status command inputs the control unit status to the A register.

Control Unit Request

A-register bit 0 equal to 1 indicates that the alternate channel (another CPU via its associated drive adapter) has requested this CPU to release control of the control unit.

Lost Data/Parity Error

A-register bit 1 equal to 1 indicates that a data byte has been lost due to improper synchronization of the SYNCIN and SYNCOUT control signals between the drive adapter and control unit during a read or write operation or that the control unit has detected a parity error within the ECC bytes during a read or write.

ECC Error

A-register bit 2 equal to 1 indicates that the control unit has detected an ECC error on a read data, read address, write data (during the drive adapters read of the sector address field), or ECC check operation. If the error occurs while reading the sector address field, drive adapter status bit A15 is also set.

Control Unit Instruction Execution Incomplete

A-register bit 3 equal to 1 indicates that the control unit has gone into a default condition caused by the control unit failing to generate a NORMALEND or CHECKEND interface signal to the drive adapter within 55 milliseconds after receiving a tag command.

Command Sequence/Overrun Error

A-register bit 4 equal to 1 indicates that a read or write gap B (data field) command has been received at the control unit without a prior read gap A (address field) command, or that a read or write address, or data command, was received late with respect to sector gaps A and B timing. This error probably indicates a drive adapter malfunction.

Power Failure

A-register bit 5 equal to 1 indicates that the control unit has detected a low-voltage condition. If a data transfer or any I/O command is in progress, the operation terminates immediately after detection of the power failure and a drive adapter alarm condition is generated. Following this, the program has approximately 2 milliseconds to read status and/or shut down the disk subsystem before the control unit becomes inoperable. This status bit is cleared automatically when the power is restored to normal.

Drive Status Error

A-register bit 6 equal to 1 indicates that a fault exists within one of the drive status words. The program reads the drive status to determine the conditions causing the fault.

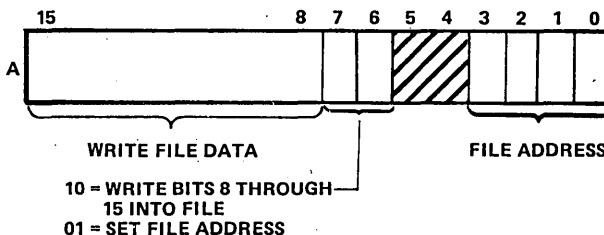
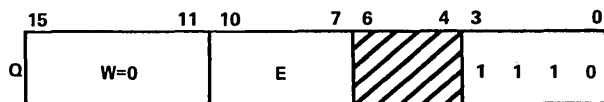
Interface Parity Error

A-register bit 7 equal to 1 indicates that the control unit has detected a parity error on the BUSOUT or TAGBUS lines between the control unit and the drive adapter.

The drive adapter accepts a control unit status input command if the control unit is selected and the drive adapter is not busy.

SELECT FILE ADDRESS/WRITE FILE

FORMAT: OUTPUT
FUNCTION CODE E-1



The select file address/write file command causes two distinctly separate operations.

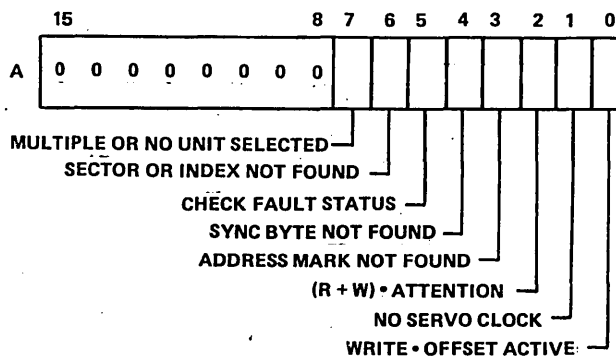
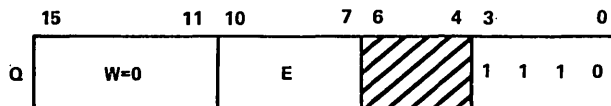
When A-register bit 7 is equal to 1, bit 6 is ignored and A-register bits 8 through 15 are written into the file address specified by bits 0 through 4. This command is used in conjunction with the read file command to echo data through all 16 drive adapter file registers.

When A-register bit 7 is equal to 0 and bit 6 is equal to 1, A-register bits 0 through 3 are stored internally and are used in conjunction with the read file command to specify 1 of 16 internal registers to be read. This is primarily a diagnostic and fault isolation aid that provides direct access to the primary working register storage within the drive adapter.

The drive adapter accepts this function command if it is not busy.

DRIVE STATUS WORD 1

FORMAT: INPUT
FUNCTION CODE: E



The drive status word 1 command inputs drive status 1 to the CPU A register. This input command allows the CPU to detect and/or monitor basic drive errors following any read or write operation. This status is only valid following a drive read or write command.

Write • Offset Active

A-register bit 0 equal to 1 indicates that the CPU attempted to perform a write operation with the heads offset in a plus or minus condition from the normal position.

No Servo Clock

A-register bit 1 equal to 1 indicates that the control unit has failed to detect the required clock signal from the servo track of the selected disk drive.

Read/Write and Attention

A-register bit 2 equal to 1 indicates that the CPU has performed a read or write operation with the drive attention flag set. This is not necessarily a fault condition.

This function code does not apply to the mini-module drive.

Address Mark Not Found

A-register bit 3 equal to 1 indicates that the drive has failed to detect an address mark within the address field of a sector. The address mark is a required synchronization point for writing or reading disk data.

Sync Byte Not Found

A-register bit 4 equal to 1 indicates that the control unit has failed to detect a sync byte within the address or data field of a sector. The sync byte is required for proper synchronization within the address or data field.

Check Fault Status

A-register bit 5 equal to 1 indicates that there is at least one bit set in the drive fault status word.

Sector or Index Not Found

A-register bit 6 equal to 1 indicates that the drive and/or control unit have/has failed to detect index or sector pulses from the disk servo track.

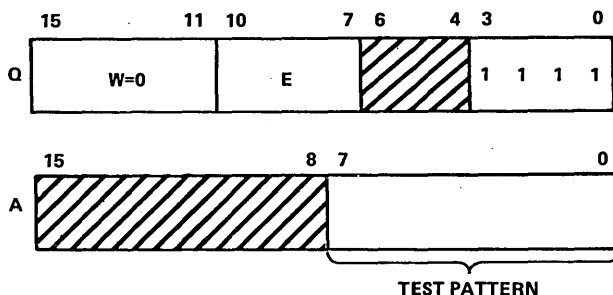
Multiple or No Unit Selected

A-register bit 7 equal to 1 indicates that more than one drive responded to a unit select command (that is, they have the same logical address) or that no unit responded to the unit select command.

The drive adapter accepts the command if it is not busy and the control unit is concurrently selected.

CONTROL UNIT ECHO OUTPUT DATA

FORMAT: OUTPUT
FUNCTION CODE: F



The control unit echo output data command transmits the test data pattern to the control unit from the A register.

A-register bits 0 through 7 may be any binary pattern. The data output via this command may be input and verified by the control unit echo input data command.

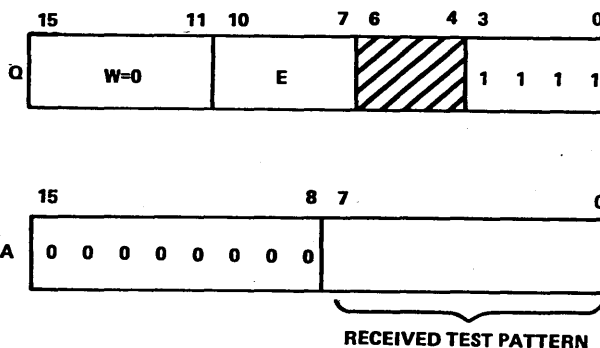
This command, in conjunction with the corresponding echo input data command, provides a functional verification of the command, status, and data paths between the drive adapter and control unit.

This command is intended to be a diagnostic aid that allows the CPU to verify the BUSOUT and BUSIN data paths between the drive adapter and the control unit.

The drive adapter accepts this command if the control unit is selected and the drive adapter is not busy.

CONTROL UNIT ECHO INPUT DATA

FORMAT: INPUT
FUNCTION CODE: F



The control unit echo input command reads back control unit test data to the A register.

This command allows the CPU to input the binary data pattern that is output to the control unit via the control unit echo output data command.

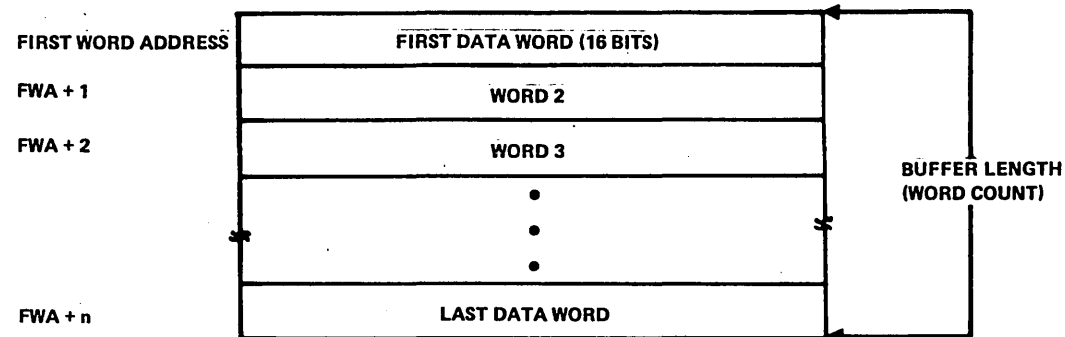
When used in conjunction with the control unit echo output data command, it allows full echo checking of the command, status, and data paths between the drive adapter and control unit.

The drive adapter accepts this command if it is not busy; however, the input data is only meaningful when this command is immediately preceded by the control unit echo output data command.

WORD FORMATS

DATA BUFFER ORGANIZATION

For DMA data operations, the organization of the data buffer written from, or read, into main memory is shown in figure 2-3.



0362-1

Figure 2-3. Data Buffer

ADDRESS FIELD BUFFER ORGANIZATION

The identifying data block written at the start of each physical sector is known as the gap A address field. It is created by initiating a DMA write address function with the buffer formatted in memory as in figure 2-4. Each address field consists of five memory words for each sector.

The address field is always read by the drive adapter hardware prior to initiating any data transfers to the file. This allows the drive adapter to determine its current sector address position relative to the software requested (target) address.

A DMA read address function reads the address field from the selected drive into main memory as in figure 2-4. Multiple address fields are read by increasing the buffer length count by five for each sector desired.

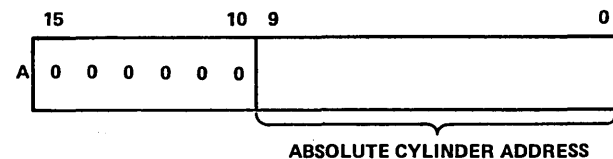
ADDRESS FIELD WORDS

Flag Bytes

The four flag bytes are not used by the hardware. The operating system software uses these fields for alternate track assignments.

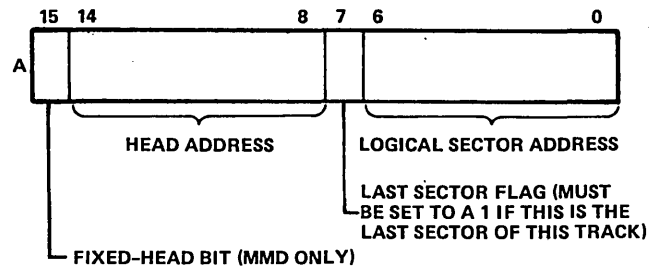
Cylinder Address

The format of this word must be as follows:



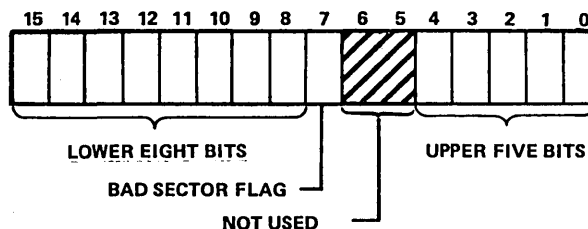
Head/Sector

The format for this word must be as follows:



Field Length

This word must contain the 13-bit number equal to the number of bytes contained within the data field of the sector minus 1 (that is, 2 times the number of words minus 1 byte). The format of this word must be as follows:



If the storage disk (media) data field of a sector contains a bad spot (a bad location in the storage area, a sector that cannot be corrected by an error recovery algorithm), the software can flag (identify) the sector by writing a one in the bad sector bit (7) of the field length word. Alternate cylinder, head, and sector addresses are contained in the four flag bytes that reside in the module drive adapter file (figure 4-3).

When the bad sector is read, a hardware interrupt is generated. The bad sector flag indicates to the software that the sector contains a bad spot. An alternate sector address is then obtained from the flag bytes.

SECTOR FORMAT

Figure 2-5 illustrates the sector format. This is provided as general information only. The sync bytes, address marks, and ECC words are created by hardware in the control unit and cannot be altered by software. Only the gap A address or gap B data fields are transferred through the drive adapter during DMA operations.

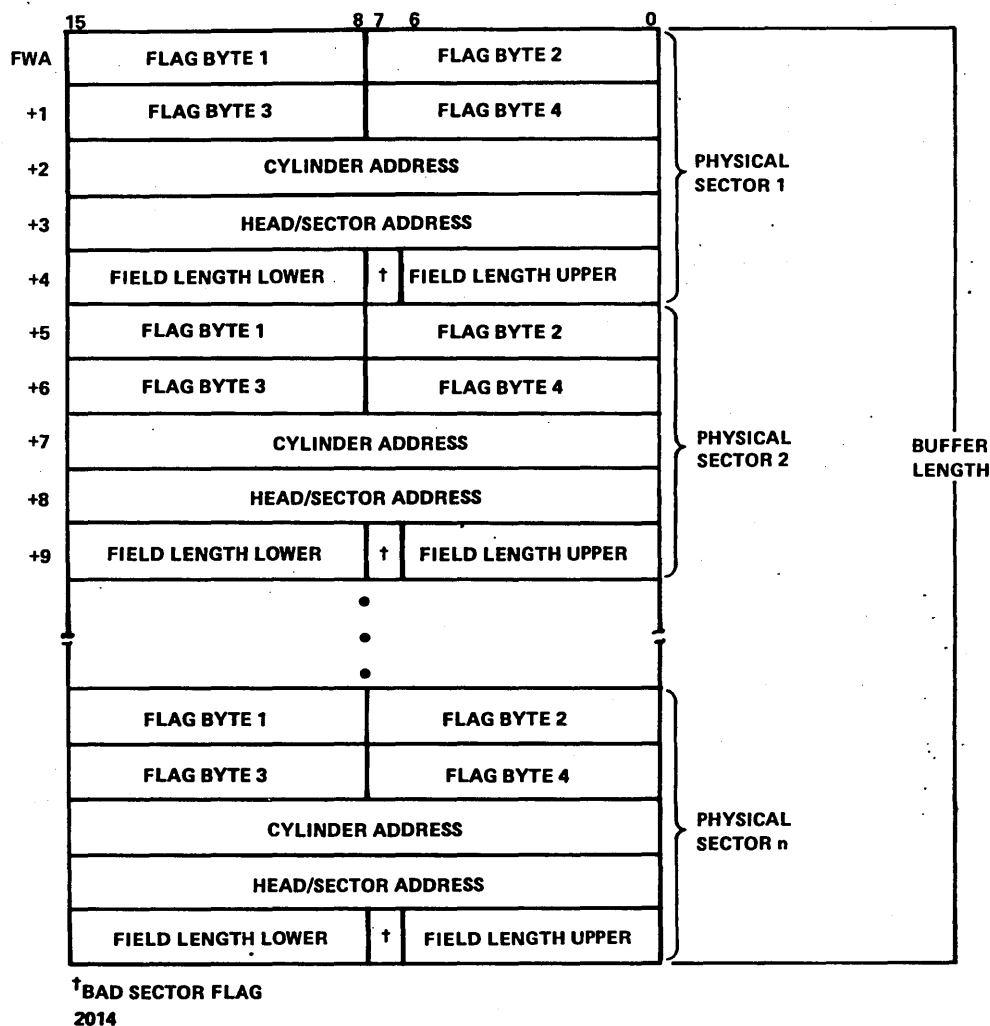


Figure 2-4. Address Field Buffer

INTERRUPTS

There are six interrupt-causing conditions within the drive adapter. Each condition is individually enabled (allowed) or disabled (locked out) by software.

Through execution of a director function command (function code 8), an interrupt mask register (with bits corresponding to the interrupt conditions) may be set or cleared (enabled/disabled) in the drive adapter. The interrupt conditions available from the drive adapter† are as follows:

- Alternate drive adapter
- Transfer complete
- Alarm condition
- Seek end†

- End of cylinder
- Control unit selected

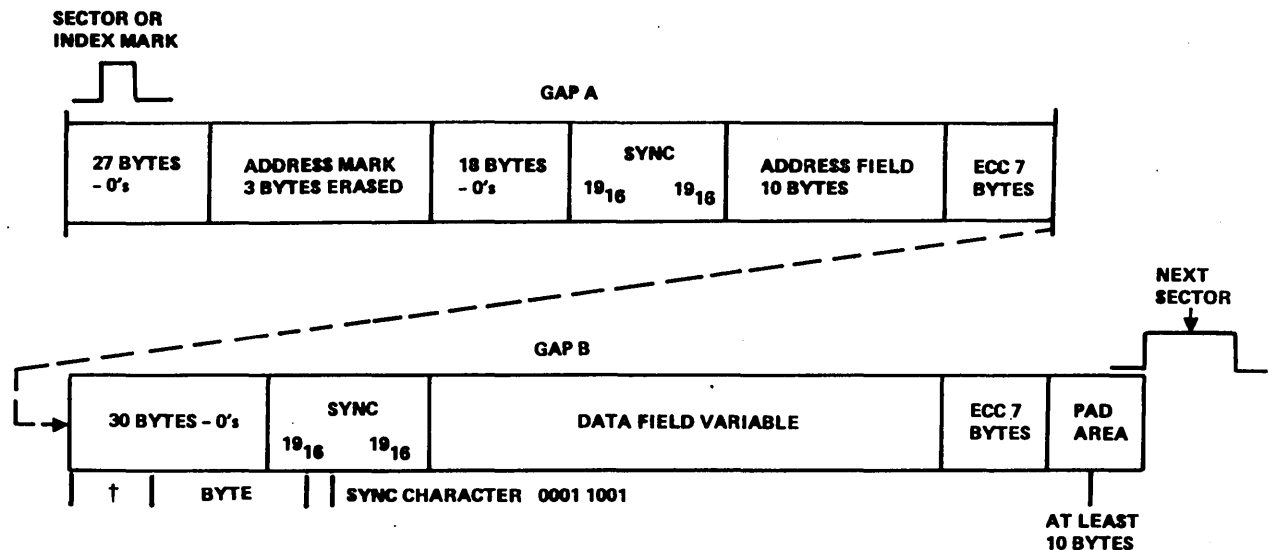
The logical OR of all drive adapter interrupts is presented to the CPU as a common single interrupt. Following any drive adapter interrupt, the CPU must read status to determine which of the enabled conditions caused the interrupt.

ALARM CONDITIONS

Various fault or abnormal conditions can occur within the module drive system. The detection of these conditions causes the following:

- The setting of the alarm status bit
- Alarm interrupt (if enabled) to the CPU

†Requires a hardware jumper on the drive adapter board



† THIS PERIOD IS THE TIME AVAILABLE FOR THE DRIVE ADAPTER TO DETERMINE THAT THE ADDRESS FIELD IT HAS JUST READ IS THE TARGET (DESIRED) ADDRESS AND THAT THE GAP B FIELD FOLLOWING IS THE DATA THAT MUST BE TRANSFERRED UNDER DIRECT MEMORY ACCESS. THIS TIME IS NOT A SOFTWARE DECISION PERIOD FOR INITIATING A DIRECT MEMORY ACCESS DATA OPERATION.

0364-1

Figure 2-5. Sector Format

- Protect fault
- Memory addressing error
- Forced release of control unit
- Lost data
- Control unit error
- Storage parity error (DMA read operation only)

- Seek (any seek operation) - 20 microseconds
- DMA read or write - Any DMA read or write command causes the BUSY signal to be set until the end of the last sector being operated on is reached and an end-of-cylinder condition is detected, or an abnormal condition causes the operation to be aborted.

PROGRAMMING AIDS AND CONSIDERATIONS

DRIVE ADAPTER BUSY

The two commands the drive adapter accepts while busy are the director function and drive adapter status request commands (function code 8). Initiation of any other A/Q command to the drive adapter while busy causes an external reject condition.

After accepting the I/O command, the drive adapter becomes busy. Various commands result in the drive adapter staying busy for a period longer than the execution time of the I/O command. These commands are as follows:

- Initiate poll - The drive adapter stays busy until the control unit responds with the poll status (approximately 40 microseconds).
- Format write - 16.1 to 33.2 milliseconds

STAND-ALONE DRIVE ADAPTER FUNCTIONS

The drive adapter accepts any stand-alone command function from the CPU if it is not busy. Some functions are directed at the control unit or drives and require that the drive adapter be connected to the control unit (selected) before they can be executed. Attempting to execute one of these instructions without first selecting the control unit results in an I/O external reject condition.

The stand-alone commands that the drive adapter can execute without control unit selection are as follows:

- Test mode read or write
- Director function
- Set data buffer length register
- Unit select (selects the control unit if the control unit is not already selected)
- Select first word address upper/lower
- Select set file address/write file

- Read file register data
- Cylinder address status
- Sector and head address status
- Drive adapter status
- Load cylinder address

TRACK OPERATIONS

The following operations are basically track operations in that only the cylinder and head address are used; any sector address information supplied is ignored.

The list of track operations is as follows:

- Write Address - This operation begins at the index mark and continues until the buffer length register within the drive adapter equals 0.
- Format Write - This operation starts at the index mark and terminates the next time the index mark is sensed (one track only).
- Read Address - This operation begins at the index mark and continues until the buffer length register within the drive adapter equals 0.
- Read Address ECC Check - This operation begins at the index mark and continues until the buffer length register within the drive adapter equals 0.

NOTE

The read, write, and ECC check address operations may be greater than one track in length (as determined by the buffer length), but these operations always begin at the index mark of the selected head.

Seek Operations

Following the initiation of any seek operation, a seek-end interrupt (and status) is generated if the software program deselects the control unit, thereby allowing it to poll the drives. Unless the control unit polls the drive, no seek-end interrupt or status is generated. An alternative is for the program to repetitively issue an initiate poll command with the force poll update bit set.

Protected Operation

When the drive adapter is operating in the protect mode (selectable by optional jumper on the drive adapter board), I/O instructions (not having their protect bit set) cause a protect violation and are rejected by the drive adapter (external reject). The drive adapter can write into protected CPU memory only if the drive is protected and the disk read operation is initiated by a protected A/Q output command. The execution to the protect rule is a drive status request that is never rejected, regardless of the protect condition.

Table 2-7 defines how the drive adapter handles data transfers to memory with respect to CPU protect, drive adapter protect, and protected instructions.

NOTE

If the CPU protect switch is off, the protected states of the drive adapter and I/O instructions are ignored.

TABLE 2-7. DRIVE ADAPTER PROTECT CONDITIONS

CPU Protect Switch	Drive Adapter Protected (Jumper in)	Protected I/O Instruction	Result
Off	No	No	A [†]
Off	No	Yes	A [†]
Off	Yes	No	A [†]
Off	Yes	Yes	A [†]
On	No	No	B ^{††}
On	No	Yes	B ^{††}
On	Yes	No	Reject
On	Yes	Yes	A [†]

[†]A = Drive adapter can transfer to protected or unprotected memory.

^{††}B = Drive adapter can transfer to unprotected memory only.

This section contains references to the operating switch and jumper configurations, and system cabling and backplane pin assignments that must be satisfied to accomplish installation and replacement of the module drive adapter. For detailed installation procedures, refer to the applicable system installation manual.

PWA PREPARATION

JUMPERS

Prior to system operation, parameter jumpers must be installed on the drive adapter printed wiring assembly (PWA). The function of each jumper is described in section 2. The switch settings are described in the CYBER 18 Computer Systems with MOS Memory Installation Manual referenced in the preface.

DRIVE ADAPTER PWA REPLACEMENT/INSTALLATION

CAUTION

The module drive adapter PWA contains electrostatic-sensitive devices as indicated by the red solder mask. Exercise extreme care in handling to avoid damage to the board. Common practices, such as touching a grounded surface before handling, inserting into antistatic or conductive bags for storage or transfer, and repairing only at properly equipped and grounded work stations should be strictly followed.

The normal position of the drive adapter is slot H of the micro-programmable processor (MP) chassis. The drive adapter is inserted into the MP chassis with the component side of the PWA facing left. If the standard slot position is not vacant, the drive adapter PWA may be inserted into any available A/Q-DMA slot position.

CABLING

Figure 1-1 illustrates the disk subsystem cabling for a dual-CPU configuration. The input/output cables (BUSIN/BUSOUT) run directly from the CPU backplane slot assigned for the drive adapter logic board to the control unit connector panel. The connectors for the CPU end of the cable plug into a paddleboard that slips over the backplane pins (identified in table 3-1).

CABLES

The interconnecting cables are 24 twisted pairs with outside shield. The standard length supplied is 25 feet (7.62 meters). The maximum cable length supported is 50 feet (15.24 meters).

BACKPLANE PIN ASSIGNMENTS

Table 3-1 identifies the BUSIN and BUSOUT cable lines and correlates the backplane pin numbers to the control unit connector pins.

CHECKOUT

Powering up the CPU system provides the drive adapter with its required input voltages of +5V and -12V through the CPU backplane voltage bus.

With the exception of the autoloader switch, the drive adapter does not contain any operating switches or indicators. Connection of the external autoloader switch requires the normally open section of the switch to be connected to backplane pin 42 of the drive adapter slot. The normally closed section should be connected to pin 45. The wiper (common) section of the switch should be connected to pin 43 (ground).

Subsystem checkout proceeds using the appropriate diagnostics. (Refer to section 6 for the required diagnostics.) After confirming that the remaining components of the subsystem are powered up and made ready, the control unit/drive circuit breakers may be turned on and the scratch pack loaded on selected drives.

TABLE 3-1. DRIVE ADAPTER/CONTROL UNIT SIGNAL PIN ASSIGNMENTS

Signal	Drive Adapter Backplane Pin	Control Unit Connector Pin	Direction
Recycle	88	u/w	To control unit BUSOUT cable
Select hold 0	98	A/C	To control unit BUSOUT cable
Select hold 1	99	B/D	To control unit BUSOUT cable
BUSOUT 0	297	E/H	To control unit BUSOUT cable
BUSOUT 1	298	F/J	To control unit BUSOUT cable
BUSOUT 2	296	K/M	To control unit BUSOUT cable
BUSOUT 3	299	L/N	To control unit BUSOUT cable
BUSOUT 4	91	P/S	To control unit BUSOUT cable
BUSOUT 5	94	R/T	To control unit BUSOUT cable
BUSOUT 6	92	U/U	To control unit BUSOUT cable
BUSOUT 7	93	V/X	To control unit BUSOUT cable
BUSOUT parity	87	Y/a	To control unit BUSOUT cable
TAGBUS 0	86	Z/b	To control unit BUSOUT cable
TAGBUS 1	85	c/e	To control unit BUSOUT cable
TAGBUS 2	84	d/f	To control unit BUSOUT cable
TAGBUS 3	83	h/k	To control unit BUSOUT cable
TAGBUS parity	89	j/m	To control unit BUSOUT cable
TAGOUT	95	n/r	To control unit BUSOUT cable
SYNCOUT	90	p/s	To control unit BUSOUT cable
Response	96	t/v	To control unit BUSOUT cable
Select active in	19	A/C	From control unit BUSIN cable
BUSIN 0	13	B/D	From control unit BUSIN cable
BUSIN 1	14	E/H	From control unit BUSIN cable
BUSIN 2	12	F/J	From control unit BUSIN cable
BUSIN 3	15	K/M	From control unit BUSIN cable
BUSIN 4	23	L/N	From control unit BUSIN cable
BUSIN 5	22	P/S	From control unit BUSIN cable
BUSIN 6	17	R/T	From control unit BUSIN cable
BUSIN 7	18	U/W	From control unit BUSIN cable
BUSIN parity	21	V/X	From control unit BUSIN cable
TAGVALID	4	Y/a	From control unit BUSIN cable

TABLE 3-1. DRIVE ADAPTER/CONTROL UNIT SIGNAL PIN ASSIGNMENTS (Contd)

Signal	Drive Adapter Backplane Pin	Control Unit Connector Pin	Direction
SYNCIN	24	Z/b	From control unit BUSIN cable
NORMALEND	7	c/e	From control unit BUSIN cable
CHECKEND	5	d/f	From control unit BUSIN cable
Index	6	t/v	From control unit BUSIN cable
Sector	8	u/w	From control unit BUSIN cable
Alert 0	9	h/k	From control unit BUSIN cable
Alert 1	10	j/m	From control unit BUSIN cable
Select active out	20	None	DA0 to DA1
Int. DA0	11	None	DA1 to DA0
Int. DA1	16	None	DA0 to DA1

This section contains block diagram descriptions, signal interface diagrams and tables, and descriptions of the firmware functions of the module drive adapter.

FUNCTIONAL DESCRIPTION

The drive adapter is a single-board, micro-programmed controller, which processes commands to direct the flow of data and status information between the processor and the disk subsystem. The drive adapter does not have the capability to perform arithmetic operations; its only function is control.

The control within the drive adapter is implemented by an internally stored micro program called firmware. Firmware cannot be modified; that is, the firmware code resides in a programmed read-only memory (PROM) 24 bits wide by 512 words deep.

The PROM resident firmware provides control by manipulating registers, counter, flip-flops, and an eight-bit wide source/destination data bus. The firmware may select one of eight logic blocks as a source to the data bus, and within the same firmware word, specify a destination for this source data. The firmware also may set or clear flip-flops, test certain conditions for being true or false, and jump to a new PROM address.

The drive adapter firmware does not perform the actual transfer of data to/from the disk drive. The firmware sets up control flip-flops to determine the direction and type of transfer to be performed. The drive adapter hardware logic then controls the actual data movement via DMA and the control unit BUSOUT/BUSIN data buses.

Data to be written to, or read from, the disk drive passes through a 64-word deep, first in/first out (FIFO) buffer memory. Write data, originating from the CPU memory, is transmitted and held in the FIFO buffer until the desired sector on the disk is found. This allows the drive adapter to get a head start on the disk and also eliminates the need for the CPU memory to service the disk subsystem at a constant rate.

Data read from the disk is sent to the drive adapter via the control unit data bus (BUSIN). Data is again held in the FIFO buffer until the CPU memory becomes available. This allows the memory to fall behind the disk by a maximum of 64 words and eliminates disk/memory synchronization.

The address fields written on the disk originate from the CPU memory and pass through the drive adapter FIFO buffer in the same manner as data. The 5 words (10 bytes) of address field for each physical sector contain information as follows:

- Two words of flag bytes (used for alternate track, sector, and cylinder information)
- One word of logical head and sector address

- One word of cylinder address
- One word of field length (number of bytes contained in this sector) plus the bad sector bit

For further information, refer to section 2.

Prior to initiating an actual data transfer, the CPU software program issues target sector, head, and cylinder address commands. This information is stored in the drive adapter random access memory (RAM). After receiving a data transfer command from the CPU, the drive adapter waits for a sector mark from the selected disk drive. When the sector mark is received, the drive adapter reads and stores, in the RAM, the 10 bytes (5 words) of address field. The drive adapter then compares the actual head, sector, and cylinder address information just read with the previously issued target address. The process of read and compare continues until the target and actual address agree, at which time the data transfer commences. The data transfer continues to the end of the current sector. If the data length is greater than one sector, the drive adapter increments the target sector by 1 and begins searching for the next logical sector.

The logical sector addresses usually are written sequentially. The logical sector address may be written in the following manner:

0, 32, 1, 33, 2, 34 _____ 30, 62, 31, 63

This technique is known as sector interlacing and may be used where system requirements dictate a slower data transfer rate. The drive adapter skips one sector between each transferred sector by comparing the target address to the actual address. This technique halves the data transfer rate.

BLOCK DIAGRAM DESCRIPTION

Figure 4-1 is a block diagram of the drive adapter that is described in the following subsections.

MICRO CONTROLLER

The drive adapter is centered around the micro controller, which consists of the following functional elements:

- Master clock
- Control memory (PROMs)
- Micro-address register
- Micro-address multiplexer
- Jump condition multiplexer
- Control flip-flops
- Destination strobes

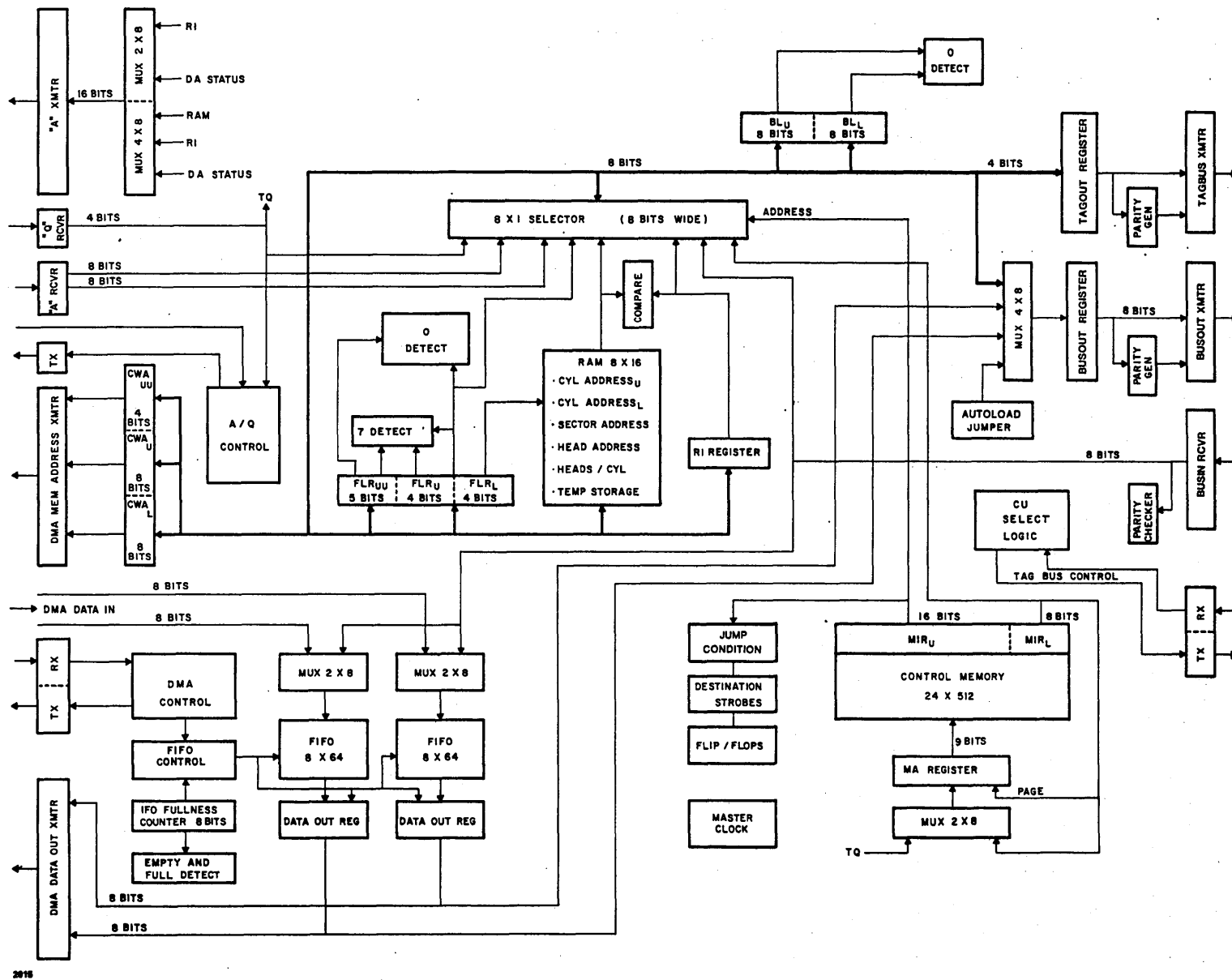


Figure 4-1. Module Drive Adapter, Block Diagram

The master clock is a free-running clock with a period of 197 nanoseconds. One firmware word is accessed and executed each period.

The control memory consists of three factory-programmed integrated circuits, each containing 512 eight-bit bytes. The three circuits are paralleled and accessed simultaneously to provide a 24-bit wide micro-instruction word.

The micro-address register (MAR) is loaded from the lower eight bits of the micro-instruction word. When a CPU-A/Q command is entered the lower bits of the Q register are used to load a Q-transform address. The appropriate load address is determined at the micro-address multiplexer. The MAR also may be incremented if the jump condition logic does not indicate a jump.

The jump condition multiplexer, control flip-flops, and destination strobes are essentially decoders. These elements are described in section 5.

INTERNAL BUS

Command processing and internal data movement is accomplished via the internal bus (IB). The internal bus consists of eight source registers and seven destination registers. The source registers include the following:

- Least significant four bits of the CPU Q register
- Lower eight bits of the CPU A register
- Upper eight bits of the CPU A register
- Drive adapter general purpose working register (R1 register)
- Output of the 8 by 16 RAM
- BUSIN register
- Least significant eight bits of the control memory data (MIRL, direct micro-instruction register, lower).
- Least significant four bits of the field length register (FLR)

The destination registers loaded from the internal bus includes the following:

- R1 register (8 bits)
- The 8 by 16 RAM (8 bits)
- Field length register (13 bits)
- Buffer length register (16 bits)
- DMA current word address register (20 bits)
- TAGBUS register (4 bits)
- BUSOUT register (8 bits)

The registers larger than eight bits in length require more than one destination strobe to perform a complete load

from the eight-bit wide input bus. The field length register and the buffer length register require two destination strobes. The current word address register (CWAR) requires three destination strobes.

The lower four bits of the field length register are used to address the 16 locations (0 through F) of the RAM. The outputs of the RAM and R1 registers may be compared for equality. The condition of the compare is applied to the jump condition multiplexer to permit the firmware to make a decision based on the state of equality.

A/Q INTERFACE

The interface to the CPU A and Q registers consists of control logic, Q-register receivers, A-register receivers, and transmitters. The A/Q control logic performs decoding of the Q-register bits for implementation of the drive adapter status and director function commands.

CONTROL UNIT INTERFACE

The control unit interface consists of the following (figure 4-1) blocks:

- BUSIN receiver and parity checker
- TAGBUS register, parity generator, and transmitters
- BUSOUT multiplexer and autoloader jumpers
- BUSOUT register, parity generator, and transmitters
- TAGBUS control

The input to the BUSOUT multiplexer is usually the internal bus for functions and commands to the control unit. During the autoloader sequence, the autoloader jumpers are momentarily enabled when the firmware issues the drive select command. The hexadecimal (0 through F) positions of the jumpers determine which logical drive performs the autoloader.

During data transfers, the BUSOUT register is enabled to become transparent (not latch the data). The input to the BUSOUT multiplexer is set to the first byte (eight bits) to transfer to the disk. When the first byte has been transferred, the TAGBUS control logic switches the input to the second byte. These functions continue until the last byte of the last word is transferred.

The control unit select logic performs control unit selection/deselection and resolves simultaneous selection in dual-CPU configurations.

The TAGBUS scheme involves a tag command (output to the control unit) and a response from the control unit (BUSIN). Most TAGOUT commands have a BUSIN response, which is input during the command sequence. This BUSIN status is stored in the R1 register until a CPU input-to-A command is issued to the drive adapter. The tags and their corresponding inputs are listed in table 4-1.

Figure 4-2 illustrates the drive adapter/control unit transmitter/receiver configuration.

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 1)

	TAGBUS and BUSOUT Commands From Drive Adapter											
	TAG BIT				BUSOUT BIT 0	BUSOUT BIT 1	BUSOUT BIT 2	BUSOUT BIT 3	BUSOUT BIT 4	BUSOUT BIT 5	BUSOUT BIT 6	BUSOUT BIT 7
UNDEFINED	0	0	0	0								
DRIVE REQUEST	0	0	0	1		CLEAR SEEK INITIATED	CLEAR SEEK COMPLETE	ALT CHANNEL REQUEST	UNIT SELECT 8 ₂₃	UNIT SELECT 4 ₂₂	UNIT SELECT 2 ₂₁	UNIT SELECT 1 ₂₀
POLL UPDATE SEEK END LOWER	0	0	1	0	1		0	0	0	0	0	0
POLL UPDATE SEEK END UPPER					1		0	0	1	0	0	0
POLL ALTERNATE CH REQ					0		0	0	ADDRESS 2 ₂₃	ADDRESS 2 ₂₂	ADDRESS 2 ₂₁	ADDRESS 2 ₂₀
POLL CPU NUMBER					0		0	1	ADDRESS 2 ₂₃	ADDRESS 2 ₂₂	ADDRESS 2 ₂₁	ADDRESS 2 ₂₀
POLL SEEK COMPLETE					0		1	0	ADDRESS 2 ₂₃	ADDRESS 2 ₂₂	ADDRESS 2 ₂₁	ADDRESS 2 ₂₀
POLL SEEK INITIATED					0		1	1	ADDRESS 2 ₂₃	ADDRESS 2 ₂₂	ADDRESS 2 ₂₁	ADDRESS 2 ₂₀
UNIT SELECT	0	0	1	1					UNIT SELECT 8 ₂₃	UNIT SELECT 4 ₂₂	UNIT SELECT 2 ₂₁	UNIT SELECT 1 ₂₀
TARGET	0	1	0	0	1=XFER TARGET 0=RD SECTOR	SECTOR COUNT 64 ₂₆	SECTOR COUNT 32 ₂₅	SECTOR COUNT 16 ₂₄	SECTOR COUNT 8 ₂₃	SECTOR COUNT 4 ₂₂	SECTOR COUNT 2 ₂₁	SECTOR COUNT 1 ₂₀
LOW CYLINDER	0	1	0	1	CAR COUNT 128 ₂₇	CAR COUNT 64 ₂₆	CAR COUNT 32 ₂₅	CAR COUNT 16 ₂₄	CAR COUNT 8 ₂₃	CAR COUNT 4 ₂₂	CAR COUNT 2 ₂₁	CAR COUNT 1 ₂₀

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 1) (Contd)

TAGBUS and BUSOUT Commands From Drive Adapter												
	TAG BIT				BUSOUT BIT 0	BUSOUT BIT 1	BUSOUT BIT 2	BUSOUT BIT 3	BUSOUT BIT 4	BUSOUT BIT 5	BUSOUT BIT 6	BUSOUT BIT 7
	0	1	2	3								
HIGH CYLINDER	0	1	1	0							CAR COUNT 512 ²⁹	CAR COUNT 256 ²⁸
HEAD ADDRESS	0	1	1	1				HEAD ADDRESS 6 ²⁴	HEAD ADDRESS 5 ²³	HEAD ADDRESS 4 ²²	HEAD ADDRESS 2 ²¹	HEAD ADDRESS 1 ²⁰
STATUS RPS	1	0	0	0				1	0	0	0	0
STATUS - PHYSICAL UNIT								0	0	1	0	0
STATUS - CU								0	0	0	1	0
DRIVE STATUS 1								0	0	0	0	1
DRIVE STATUS 2								0	1	0	0	0
READ ADDRESS (GAP A)	1	0	0	1	XFER SECTOR	GA = 0			RESIDUE BYTE COUNT 8 ²³	RESIDUE BYTE COUNT 4 ²²	RESIDUE BYTE COUNT 2 ²¹	RESIDUE BYTE COUNT 1 ²⁰
READ DATA (GAP B)					XFER SECTOR	GB = 1			RESIDUE BYTE COUNT 8 ²³	RESIDUE BYTE COUNT 4 ²²	RESIDUE BYTE COUNT 2 ²¹	RESIDUE BYTE COUNT 1 ²⁰
WRITE ADDRESS (GAP A)	1	0	1	0	XFER SECTOR	GA = 0			RESIDUE BYTE COUNT 8 ²³	RESIDUE BYTE COUNT 4 ²²	RESIDUE BYTE COUNT 2 ²²	RESIDUE BYTE COUNT 1 ²⁰
WRITE DATA (GAP B)					XFER SECTOR	GA = 1			RESIDUE BYTE COUNT 8 ²³	RESIDUE BYTE COUNT 4 ²²	RESIDUE BYTE COUNT 2 ²²	RESIDUE BYTE COUNT 1 ²⁰
ECC SHIFT P0							1					
ECC SHIFT P1, P2, P3	1	0	1	1				1				
ECC CONDITIONS											1	
ECC PATTERNS												1

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 1) (Contd)

	TAGBUS and BUSOUT Commands From Drive Adapter											
	TAG BIT				BUSOUT BIT 0	BUSOUT BIT 1	BUSOUT BIT 2	BUSOUT BIT 3	BUSOUT BIT 4	BUSOUT BIT 5	BUSOUT BIT 6	BUSOUT BIT 7
	0	1	2	3								
DIAGNOSTIC	1	1	0	0	RTZ	CLEAR ATTENTION	CLEAR CHECK DIAG.	CLEAR FAULT STATUS	CLEAR ERROR RECOVERY	CLEAR RPS	CLEAR DRIVE STATUS 1	CLEAR CU STATUS
ERROR RECOVERY	1	1	0	1	EARLY STROBE	LATE STROBE	POSITIVE OFFSET	NEGATIVE OFFSET	2 ³	2 ²	2 ¹	2 ⁰
FORMAT WRITE	1	1	1	0								
D.A. TO D.A.	1	1	1	1	X0	X1	X2	X3	X4	X5	X6	X7

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 2)

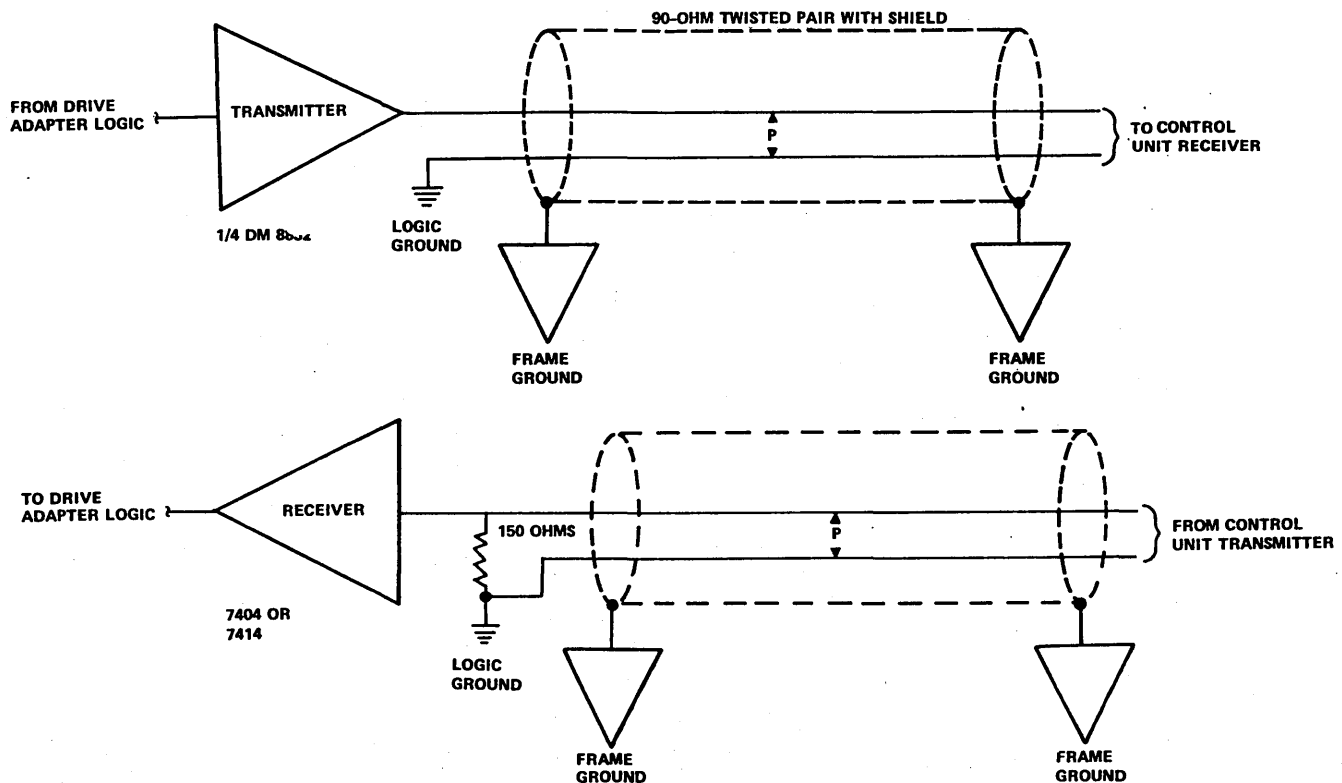
	BUSIN Response from Disk and Control Unit											
	TAG BIT				BUSIN BIT 0	BUSIN BIT 1	BUSIN BIT 2	BUSIN BIT 3	BUSIN BIT 4	BUSIN BIT 5	BUSIN BIT 6	BUSIN BIT 7
	0	1	2	3								
UNDEFINED	0	0	0	0								
DRIVE REQUEST	0	0	0	1								
POLL UPDATE SEEK END LOWER												
POLL UPDATE SEEK END UPPER	0	0	1	0								
POLL ALTERNATE CH REQ					LOGICAL DRIVE ALTERNATE CHANNEL REQUEST							
POLL CPU NUMBER					CPU # ASSIGNED TO LOGICAL DRIVE							
POLL SEEK COMPLETE					SEEK COMPLETE LOGICAL DRIVE							
POLL SEEK INITIATED					SEEK INITIATED LOGICAL DRIVE							
UNIT SELECT	0	0	1	1	1 = 400 TPI 0 = 200 TPI	DRIVE ID		ATTENTION	UNIT SELECT 8 2 ³	UNIT SELECT 4 2 ²	UNIT SELECT 2 2 ¹	UNIT SELECT 1 2 ⁰
TARGET	0	1	0	0	TEST BIT 128 2 ⁷	READ SECTOR 64 2 ⁶	READ SECTOR 32 2 ⁵	READ SECTOR 16 2 ⁴	READ SECTOR 8 2 ³	READ SECTOR 4 2 ²	READ SECTOR 2 2 ¹	READ SECTOR 1 2 ⁰
LOW CYLINDER	0	1	0	1			ON CYLINDER	UNIT READY			OFFSET ACTIVE	CHECK DIAGNOSTIC

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 2) (Contd)

		BUSIN Response from Disk and Control Unit											
		TAG BIT				BUSIN BIT 0	BUSIN BIT 1	BUSIN BIT 2	BUSIN BIT 3	BUSIN BIT 4	BUSIN BIT 5	BUSIN BIT 6	BUSIN BIT 7
		0	1	2	3								
HIGH CYLINDER		0	1	1	0								
HEAD ADDRESS		0	1	1	1								
STATUS RPS		1	0	0	0	RPS PHYSICAL UNIT 7	RPS PHYSICAL UNIT 6	RPS PHYSICAL UNIT 5	RPS PHYSICAL UNIT 4	RPS PHYSICAL UNIT 3	RPS PHYSICAL UNIT 2	RPS PHYSICAL UNIT 1	RPS PHYSICAL UNIT 0
STATUS - PHYSICAL UNIT						PHYSICAL UNIT SELECTED 7	PHYSICAL UNIT SELECTED 6	PHYSICAL UNIT SELECTED 5	PHYSICAL UNIT SELECTED 4	PHYSICAL UNIT SELECTED 3	PHYSICAL UNIT SELECTED 2	PHYSICAL UNIT SELECTED 1	PHYSICAL UNIT SELECTED 0
STATUS - CU						INTERFACE CHECK	DRIVE STATUS CHECK	POWER FAIL CHECK	CMD SEQUENCE OVERRUN	CU INST EXEC INCOMPLETE	DATA CHECK	LOST DATA	CU REQUEST
DRIVE STATUS	1					MULTIPLE OR NO UNIT SELECT	SECTOR OR INDEX ERROR	CHECK DRIVE DIAGNOSTIC	SYNC BYTE NOT FOUND	AM NOT FOUND	RD OR WRT WHILE ATTN	NO SERVO CLOCK	WRITE AND OFFSET ACTIVE
DRIVE STATUS	2							ON CYLINDER	UNIT READY			OFFSET ACTIVE	CHECK DIAGNOSTIC
READ ADDRESS (GAP A)		1	0	0	1								
READ DATA (GAP B)													
WRITE ADDRESS (GAP A)		1	0	1	0								
WRITE DATA (GAP B)													

TABLE 4-1. TAGBUS/TAGOUT COMMANDS AND BUSIN RESPONSES (PART 2) (Contd)

	BUSIN Response from Disk and Control Unit											
	TAG BIT				BUSIN BIT 0	BUSIN BIT 1	BUSIN BIT 2	BUSIN BIT 3	BUSIN BIT 4	BUSIN BIT 5	BUSIN BIT 6	BUSIN BIT 7
	0	1	2	3								
ECC SHIFT P0												
ECC SHIFT P1, P2, P3	1	0	1	1								
ECC CONDITIONS					P0 H NEQ'0	P1 NEQ PO L	P1 NEQ PO L DR P	P2 NEQ PO L	P2 NEQ PO L DR P	P3 NEQ PO L	P3 NEQ PO L DR P	P0 L NEQ 0
ECC PATTERNS					P0 BIT 18	P0 BIT 17	P0 BIT 16	P0 BIT 15	P0 BIT 14	P0 BIT 13	P0 BIT 12	P0 BIT 11
DRIVE DIAGNOSTIC	1	1	0	0	NO HEAD SELECT	WRITE FAULT	WRITE OR READ AND OFF CYL	WRITE AND READ FAULT	VOLTAGE FAULT	HEAD SELECT FAULT	SEEK ERROR	WRITE PROTECT
ERROR RECOVERY	1	1	0	1								
WRITE FORMAT	1	1	1	0								
D.A. TO D.A.	1	1	1	1	ECHO X0	ECHO X1	ECHO X2	ECHO X3	ECHO X4	ECHO X5	ECHO X6	ECHO X7



0350-1

Figure 4-2. Drive Adapter/Control Unit Transmitter/Receiver Configuration

DMA INTERFACE

The DMA interface consists of the following sections:

- DMA control logic
- FIFO control logic
- FIFO, FIFO multiplexer, and data buffer register
- Data from memory receivers
- Data to memory transmitters

Each 16-bit data word written to the disk is routed through the FIFO multiplexer and loaded into the FIFO. The first word loaded into the FIFO passes through to the output and is loaded into the FIFO data buffer. This word is held until both bytes are sent to the disk. The requirement for the first byte is sent by the control unit. After sending the first byte, the BUSOUT multiplexer is switched to the second half (byte) of the first word, which is sent to the disk on request by the control unit. The BUSOUT multiplexer then switches back to the first byte of the second word, which has been retrieved from the FIFO. This action between halves of the FIFO data buffer continues until all words are sent to the selected disk drive.

During a read data operation, the control logic transfers the bytes between the input halves of the FIFO. The first byte received is loaded into the lower half and then the second byte is loaded into the upper half. Both eight-bit halves pass independently to the FIFO output. When the entire 16-bit word is present at the FIFO output, that word is loaded into the FIFO data buffer and transmitted to memory via the DMA transmitter.

REGISTERS

R1

The R1 register is the general purpose working register within the drive adapter. This register is used for temporary storage of status received on the BUSIN line from the control unit, as a timer/counter, and for comparing equality against the RAM output.

Buffer Length Register

The buffer length register (BLR) is used to keep track of the number of 16-bit words remaining for transfer to, or from, memory. If the number of words to transfer is not an even number of sectors during a read from the disk, the

input to the FIFO is terminated when the buffer length register reaches 0 (0 detect). Any remaining words from that sector are still transferred to the drive adapter, but they are not loaded into the FIFO or transferred to memory.

If the number of words to transfer is not an even number of sectors during a write to the disk, the drive adapter fills the remainder of the last sector operated on with 0's, to permit proper ECC generation. Only the required number of data words are fetched from memory and pass through the FIFO.

Field Length Register

The field length register (FLR) performs three functions. The lower four bits of this register are used to address the RAM, so that during a RAM access the FLR is first loaded with the required address.

Secondly, the field length register also is used to keep track of the number of address or data bytes in the sector being operated on. The address field always has 10 bytes and the data field is variable, depending on the number of sectors per track. The FLR contains the number of bytes, minus 1, to be transferred. This number is always 9 for address fields. The FLR contains twice the number, minus 1 byte, of 16-bit words for the data field. The FLR is decremented for each byte transferred. The FLR 0 detect circuit is set when the FLR underflows (count equals FFF).

The third purpose of the FLR is to control the recycle signal to the control unit and involves the less than, or equal to, 7 detection circuit. The recycle signal controls a modulus 16 counter in the control unit that identifies the end of the address or data field and the beginning of the error correction code (ECC) bytes. When the FLR is decremented to a count of 7, recycle goes to a logical 0. This inhibits the counter from recycling, and when the FLR goes to 0, the ECC bytes are transferred. Recycle is always a logical 0 for the address field read or write (less than 16 bytes per sector to transfer). The modulus 16 counter does not need to recycle. The drive adapter sends the lower four bits of the FLR to the control unit as a residue byte count for loading into the recycle counter.

While reading the address fields prior to actually transferring data, the drive adapter preloads the FLR with a value of 8 and the FLR is used to address the RAM as previously described. The FLR does not keep track of the number of bytes. There are only 10 bytes written by the write address tags command. As each byte is received by the drive adapter, it is written into the RAM at the address specified by the FLR.

The FLR is preloaded with a count of eight and decremented minus 1 for each byte of address field received. When the FLR is at count 0, the next count is FFF (underflow). Each of the 10 bytes is loaded into the RAM at the cell addressed by the FLR (cells 8 through 0 and cell F). When all 10 bytes are received, the drive adapter performs the target versus actual comparison, as previously described.

RANDOM ACCESS MEMORY (FILE)

The entire contents of the random access memory (RAM) are shown in figure 4-3. Cell addresses 0 through 8 and F are previously described.

Cell 9 is used for two purposes. The first purpose is for end-of-cylinder detection. The number of heads of the selected drive is output from the A register, as part of a read or write command, to the drive adapter and stored in cell 9. When the last sector of a track (bit 7 of cell 1) is detected, the drive adapter increments the target head address and compares the target head number to the contents of cell 9. If the values are equal, the end of cylinder is set.

Cell 9 is also used to compare for a ready and on-cylinder condition from the autoloader drive. The drive adapter firmware performs this function by loading a hexadecimal 30 in this cell, reading drive status word 2 and comparing the two values for equality. Cells A, B, and D are the target information for comparison during data transfers. Cell D is also used as a time-out counter for certain tag commands to the control unit.

Cell C is a constant 0, which is initialized by a master clear command or a clear controller function command.

Cell E is a sector retry counter. This counter is decremented by minus 1 each time the target sector/head/cylinder address does not match the actual information just read. This cell is loaded with a value that allows checking of 128 sectors before reaching 0. After reaching 0, a requested-record-not-found error is generated.

PROGRAMMED LOGIC ARRAYS

The drive adapter contains three programmed logic arrays (PLAs). One PLA is used in the A/Q logic and two are used in the DMA/FIFO control logic. The PLA is a two-level AND-OR/AND-NOR combinational logic element. These devices replace the majority of the 7400 Series logic elements within the drive adapter. Each array has 16 inputs and 8 outputs. Each output can be AND-OR combinations of any of the inputs. The following example provides a general guide to interpreting the input variables to obtain a given output shown in the PLA listings in the appendix. Output XFRCM (transfer complete) of PLA/DMA1 (location L3/4) is shown with accompanying input terms as follows:

$$\underbrace{\text{TESTMD BLREQZ}}_{\text{AND}} + \underbrace{\text{BRFULL FLREQZ BLREQZ FIFOEM}}_{\text{AND}} = \text{XFRCM}$$

AND OR AND

The following 7400 Series logic gates are required to perform this same function:

- 1 7408 Two-input positive-AND gate
- 2 7404 Inverters (part of hex inverter)
- 1 7432 Two-input positive-OR gate
- 1 7420 Four-input positive-NAND gate

The required connections to these elements, (CDC symbology) are shown in figure 4-4. The amount of PWA area required to implement the one output from the 7400 Series logic elements is much greater than the area required of the PLA.

FIELD LENGTH REGISTER VALUE	CELL	FILE	MSB								LSB
000	0	FIELD LENGTH LOWER	2^7								2^0
001	1	SECTOR ADDRESS	LAST SECTOR	2^6							2^0
002	2	HEAD ADDRESS	FIXED HEAD	2^6							2^0
003	3	CYLINDER ADDRESS LOWER	2^7								2^0
004	4	CYLINDER ADDRESS UPPER								2^9	2^8
005	5	FLAG BYTE 4									
006	6	FLAG BYTE 3									
007	7	FLAG BYTE 2									
008 (PRELOAD)	8	FLAG BYTE 1									
	9	HEADS PER DEVICE	FIXED HEAD	2^6							2^0
	9	AUTOLOAD COMPARE	0	0	1	1	0	0	0	0	
	A	TARGET SECTOR ADDRESS	0	2^6							2^0
	B	TARGET HEAD ADDRESS	FIXED HEAD	2^6							2^0
	C	0 COMPARE	0								0
	D	TARGET CYLINDER ADDRESS	2^7								2^0
	D	TIMEOUT COUNTER	N^7								N^0
	E	SECTOR RETRY COUNTER		N^7							N^0
FFF	F	FIELD LENGTH UPPER	BAD SECTOR FLAG							2^{12}	2^8

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Figure 4-3. Drive Adapter File Contents

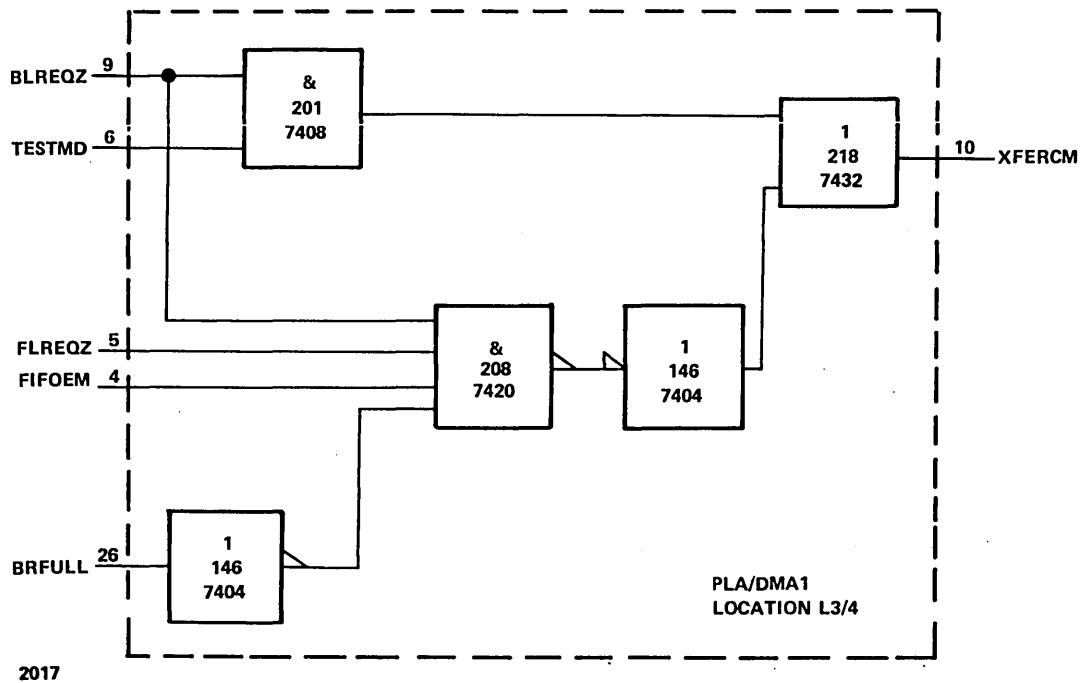


Figure 4-4. 7400 Series Logic Element Application

DRIVE ADAPTER/CONTROL UNIT INTERFACE

The drive adapter/control unit interface is implemented utilizing control signals within the adapter to transfer data and control signals via the BUSIN, BUSOUT, and TAGBUS lines.

CONTROLS SIGNALS

Figure 4-5 illustrates the single-drive adapter select sequence timing.

Select Hold

The select hold line is true when a select command is issued to the drive adapter and if an alternate drive adapter in a dual-CPU system does not have the control unit selected.

Request Release

If select hold is held true for not more than 5 microseconds, the control unit interprets this as a request for the alternate drive adapter to release the control unit. An A/Q-director request release command triggers a 5-microsecond one shot, driving the select hold line to the control unit. The control unit acknowledges this request by presenting request release status to the controlling drive adapter.

Forced Release

A 100-microsecond one shot, that also drives the select hold line, is triggered by a director function forced release bit. The control unit translates this timed condition as a demand to terminate its current operation and disconnect its selection link with the controlling drive adapter.

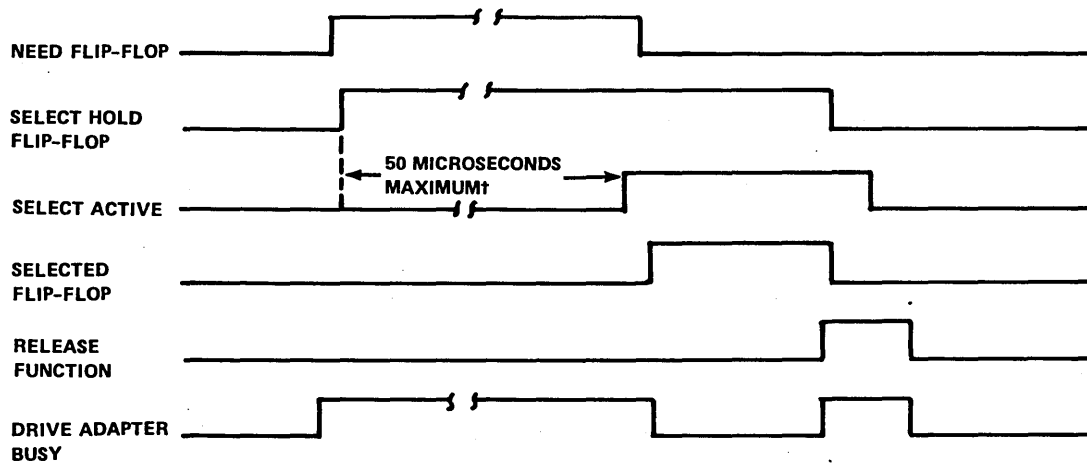
The select hold and select active lines are interlocked so that if the control unit drops its select active line (forced release) or the drive adapter drops its select hold line (release), the corresponding signal drops.

Select Active

Select active is the control unit response to the select hold request. Select active is true when the control unit acknowledges the drive adapter select hold and remains high during all subsequent operations. Select active drops when the drive adapter clears select hold or when the alternate drive adapter initiates a forced release function.

Figure 4-6 illustrates the dual-CPU select configuration. The select active line from the control unit is connected in series through drive adapter 0 to drive adapter 1. If drive adapter 0 does not have its select hold signal active, it passes the control unit select active signal to the alternate drive adapter (DA1).

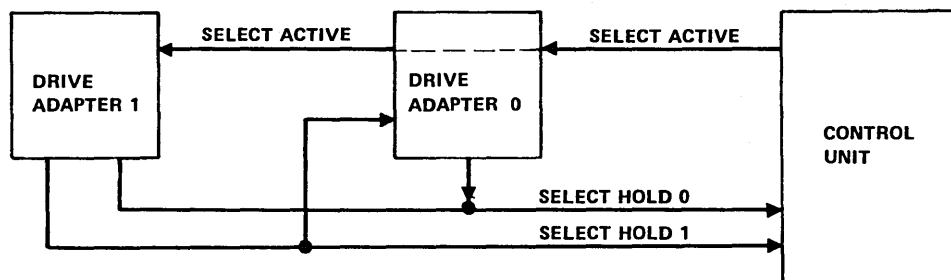
The requesting drive adapter select hold line passes through the alternate drive adapter logic and is sampled



† THIS TIME IS VARIABLE DEPENDING ON THE CONTROL UNIT AUTO-POLL CYCLE. WHEN THE AUTO-POLL CYCLE IS COMPLETE, SELECT ACTIVE GOES TRUE.

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Figure 4-5. Single Drive Adapter Select Sequence Timing



0351-1

Figure 4-6. Dual-CPU Drive Adapter Select Configuration

prior to issuing any control unit requests. Control unit select contentions are resolved at the hardware level through the priority scheme implemented by the control unit select jumpers on both drive adapters.

TAGOUT

TAGOUT is an interface line from the drive adapter indicating that TAGBUS and BUSOUT are to be sampled. TAGBUS timing is illustrated in figure 4-7. TAGOUT remains up until TAGVALID is received or until 2 microseconds have elapsed, or CHECKEND is received. TAGVALID is a normal response. A time out or CHECKEND is an abnormal sequence.

TAGVALID

TAGVALID is an interface line from the control unit indicating that the control unit has received a valid

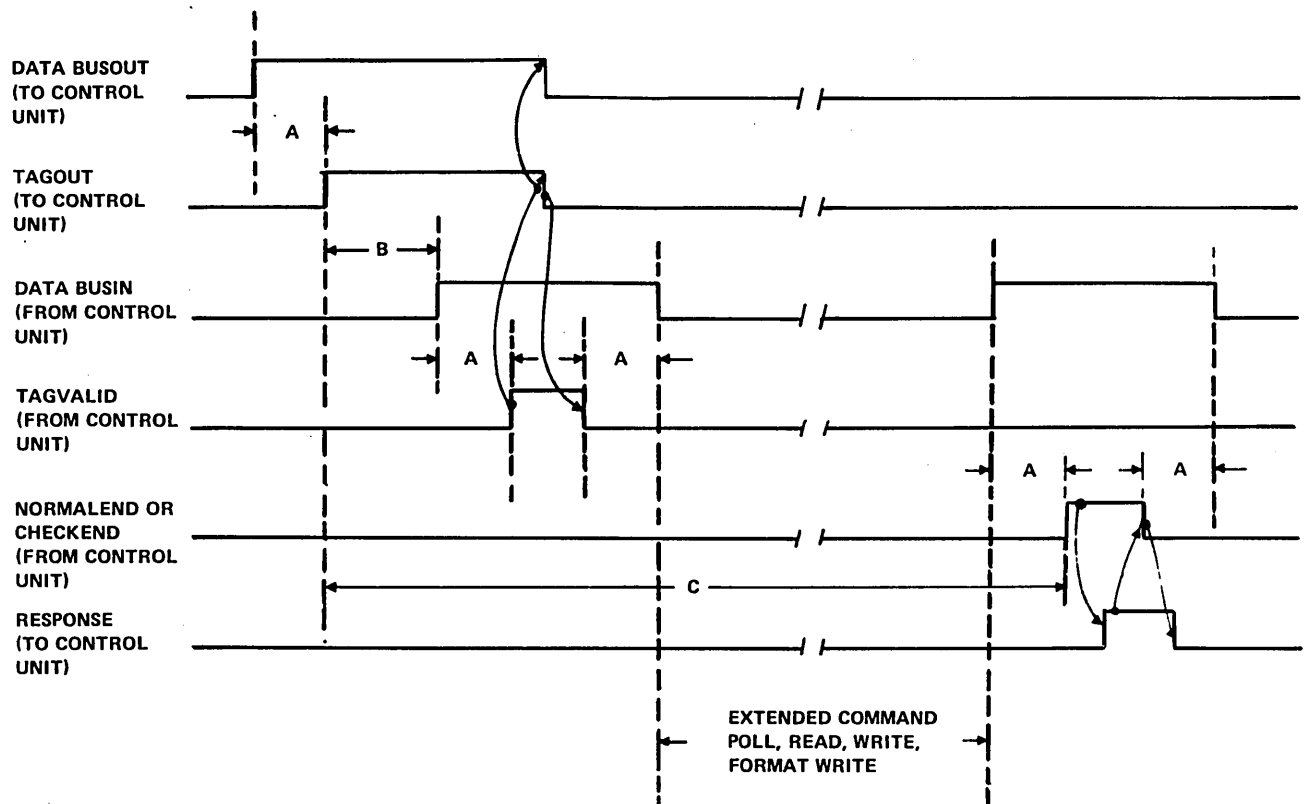
command via the TAGBUS and BUSOUT lines, parity on both buses is correct, and BUSIN contains information in response to the command. TAGVALID remains up until the drive adapter drops TAGOUT.

NORMALEND

NORMALEND is an interface line from the control unit indicating that an operation has been terminated successfully. NORMALEND occurs for every successful command executed and remains up until the RESPONSE signal is received by the control unit.

CHECKEND

CHECKEND is an interface line from the control unit indicating that an operation was unsuccessful. Every operation results in either a NORMALEND or CHECKEND signal. The CHECKEND signal remains up until the RESPONSE signal is received by the control unit.



A = 100 NANOSECONDS, MINIMUM
 B = 1.8 MICROSECONDS, MAXIMUM
 C = IMMEDIATE: 3.0 MICROSECONDS MAXIMUM
 EXTENDED: 51.8 MILLISECONDS MAXIMUM
 EXTENDED OPERATIONS: 51.8 MILLISECONDS MAXIMUM
 0354-1

Figure 4-7. TAGBUS Command Sequence Timing

RESPONSE

RESPONSE is an interface signal from the drive adapter that replies to the end conditions (NORMALEND or CHECKEND) and remains up until the control unit drops the END signal.

SYNCOUT

SYNCOUT is an interface line from the drive adapter that identifies and synchronizes data transfers. During write data (to the disk) operations, the 100-nanosecond high true pulse on this line indicates that BUSOUT contains valid data. When the control unit is ready for the next byte, it replies to the control unit with SYNCIN. During read data (from the disk) operations, the SYNCOUT signal to the control unit indicates that the drive adapter is ready to receive another byte of data on the BUSIN. When the next byte has stabilized on BUSIN, the control unit signals the drive adapter by sending SYNCIN.

SYNCIN

SYNCIN is an interface line to the drive adapter that identifies and synchronizes data transfers. The use of the

100-nanosecond high true control pulse on this line is described in SYNCOUT above. However, the control unit always starts a data transfer by sending SYNCIN, regardless of the direction of the transfer. Figures 4-8 and 4-9 illustrate the drive adapter data read and write timing sequences.

INDEX

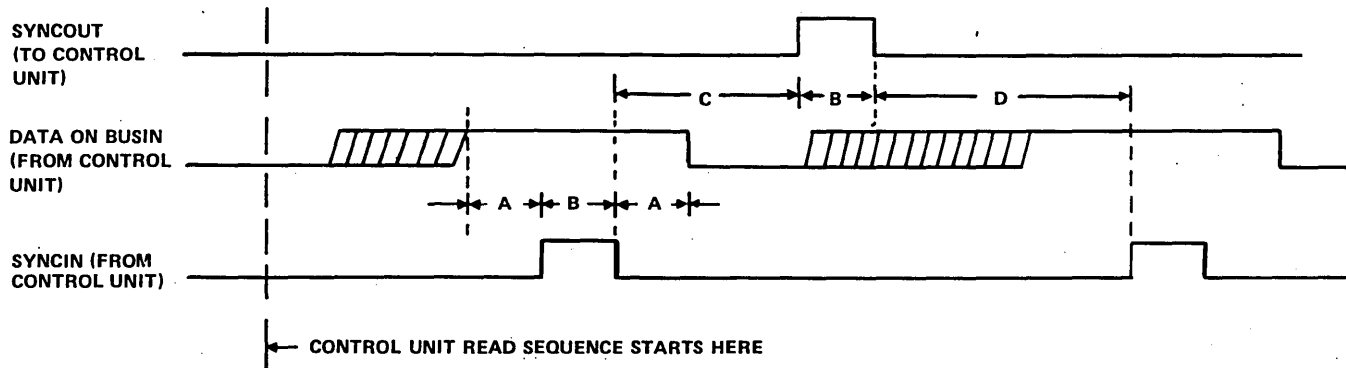
INDEX is an interface line from the control unit. The INDEX pulse marks the beginning of physical sector 0 from the selected disk drive.

SECTOR

SECTOR is an interface line from the control unit. This signal represents the physical sector pulse from the selected disk drive and marks the beginning of a data record.

RECYCLE

RECYCLE is an interface line from the drive adapter that is used to control the modulus 16 counter in the control



A = 100 NANOSECONDS, MINIMUM

B = 100 NANOSECONDS PULSE

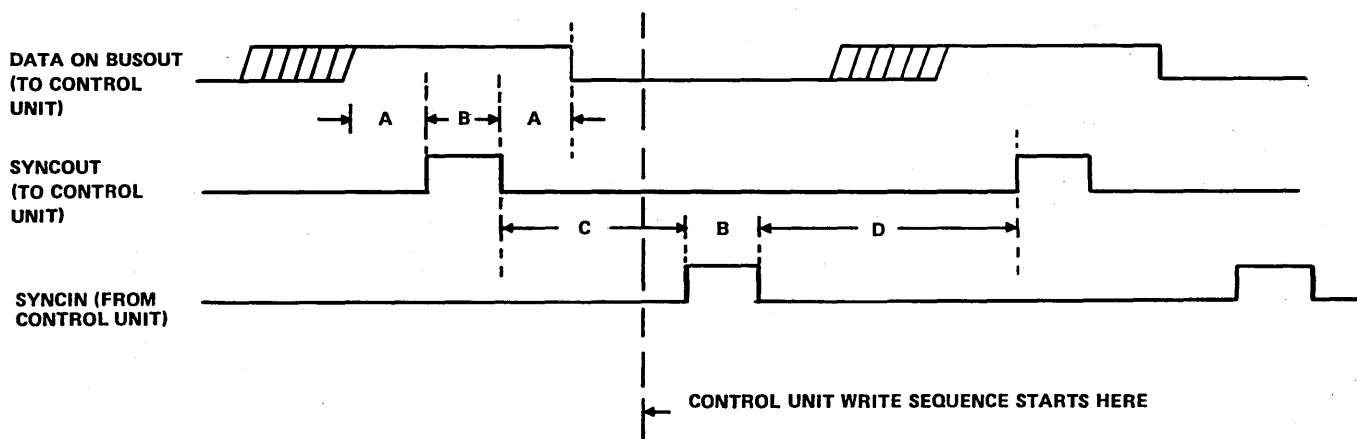
C = 100 NANOSECONDS, MINIMUM; 300 NANOSECONDS, MAXIMUM

D = 100 NANOSECONDS, MINIMUM; 500 NANOSECONDS, MAXIMUM

NOTE: THE CONTROL UNIT INITIATES THE TRANSFER BY ISSUING A SYNCIN SIGNAL ALONG WITH THE BUSIN DATA.

0355-1

Figure 4-8. Drive Adapter Data Read Timing



A = 100 NANOSECONDS, MINIMUM

B = 100 NANOSECONDS PULSE

C = 100 NANOSECONDS, MINIMUM; 300 NANOSECONDS, MAXIMUM

D = 100 NANOSECONDS, MINIMUM; 500 NANOSECONDS, MAXIMUM

NOTE: THE CONTROL UNIT INITIATES THE DATA TRANSFER BY ISSUING THE SYNCIN SIGNAL TO THE DRIVE ADAPTER.

0355A-1

Figure 4-9. Drive Adapter Data Write Timing

unit which identifies the end of the address or data field and the beginning of the ECC bytes. RECYCLE is held in a high state (logical 1) until the field length register is decremented to a count of 7. This indicates to the control unit that less than seven information bytes are left to transfer. For address field read or write operation, RECYCLE is low during the entire operation (that is, with less than 16 bytes to transfer, the control unit counter does not need to recycle).

ALERT

There are two ALERT interface lines from the control unit; one line is assigned to each drive adapter. A 100-nanosecond pulse on this line indicates that a seek-end condition exists on one of the disk drives. In a system with two drive adapters connected to one control unit, the ALERT signal is sent only to the drive adapter that initiated the seek.

INTERFACE BUS DESCRIPTION

BUSIN

BUSIN consists of nine lines (eight plus parity) from the control unit to the drive adapter that are used to complete the following:

- Convey status information from the control unit to the drive adapter. It is accompanied by TAGVALID, NORMALEND, or CHECKEND control signals from the control unit.
- Transmit data bytes to the drive adapter. Data is signified by the control unit's assertion of SYNCIN.

BUSOUT

BUSOUT consists of nine lines (eight plus parity) from the drive adapter to the control unit that are used to:

- Convey parameter information related to the TAGBUS command
- Transmit data bytes to the control unit

TAGBUS Out

The TAGBUS consists of five lines (four plus parity) from the drive adapter to the control unit that are used to define the control unit command. The TAGBUS lines are accompanied by the TAGOUT command.

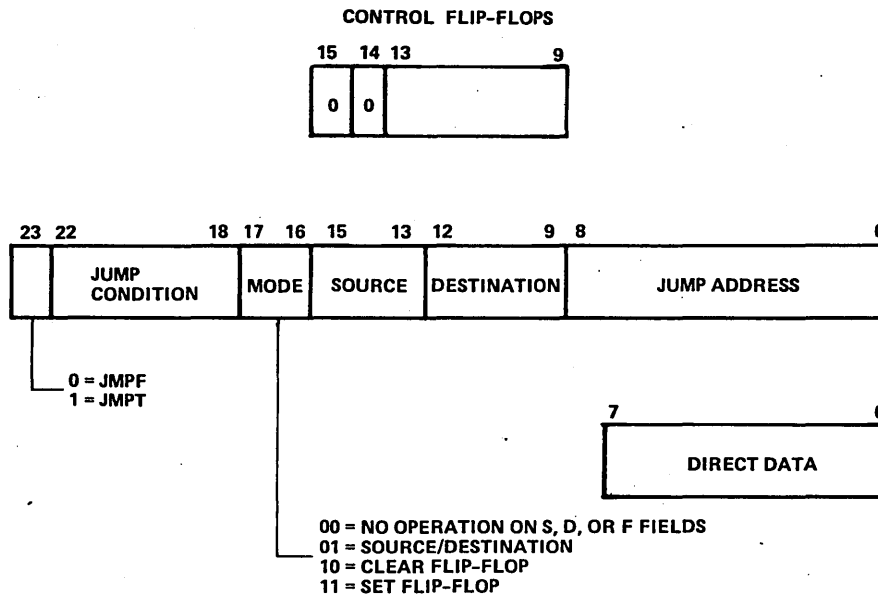
DRIVE ADAPTER FIRMWARE

The 24-bit micro-instruction word is divided into specific fields that define the operation within the drive adapter. The fields are grouped so that certain operations can be done simultaneously. The field groups are shown in figure 4-10.

MICRO-INSTRUCTION FIELD GROUPS

Jump Condition (JC)

Bits 18 through 22 are used to select 1 of 32 possible jump conditions. Within the drive adapter, only 27 of the possible jump conditions are used. The jump conditions allow the micro program to make true/false decisions on both internal and external conditions and branch (or jump)



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Figure 4-10. Drive Adapter Micro-Instruction Field Groups

accordingly. Bit 23 of the micro instruction provides added micro-programming flexibility by allowing the selected condition to be tested for either a true or false state.

Mode (M)

Bits 16 and 17 are used to define the specific micro operation to be performed (move data or set/clear control flip-flops). The binary coding of these two bits determines the use of micro-instruction bits 9 through 15.

Source (S)

Bits 13 through 15 specify 1 of 8 possible data sources. In this case, data is gated onto the internal bus. The source field of the micro instruction is meaningful only if the M field is a binary 01.

Destination (D)

Bits 9 through 12 specify 1 of 16 possible destinations. Decoding of the D field results in a strobe signal that is generally used to load data into a destination register.

Control Flip-Flops (F)

Bits 9 through 13 define 1 of 32 possible control flip-flops. Only 24 of the possible flip-flops are used. This coding for bits 9 through 13 is enabled only when M-field bit 17 is a logical 1. In this case, bit 16 of the M field determines whether the addressed flip-flop is set or cleared.

Jump Address (JA)

Bits 0 through 8 specify the address of the next micro instruction to be executed if the selected jump condition is satisfied. Since the JA field consists of nine bits, the micro program jumps directly to any address within the total 512 words of the read-only memory.

Direct Data (DD)

Micro-instruction bits 0 through 7 can be used directly as a data source onto the internal bus. These bits are used for direct data only when it is certain that the jump condition is not satisfied and the jump address is not used. In this case, micro-instruction execution becomes sequential.

NOTE

Bits 0 through 7 are never used for both direct data and a jump address within the same micro instruction.

MICRO-INSTRUCTION WORD FORMATS

A set of mnemonics is developed to describe the instruction set of the drive adapter by using the field

abbreviations and combining them into allowable combinations. The conditional jump micro instructions are coded with the following mnemonics:

- JMPT (jump if the condition is true)
- JMPF (jump if the condition is false). An unconditional jump is coded as UJP and sequential micro instructions are coded as SEQ. In addition, the remaining micro-instruction operating fields (S, D, F, M, JA, and DD) are combined with the mnemonics mentioned above to form the possible combinations of micro-instruction mnemonics and abbreviations. They are used throughout the micro-program flowcharts and listings (appendixes B and C) to facilitate understanding, and are listed in figure 4-11.

Each micro instruction contains a jump condition test field (JC field). If the jump condition is satisfied, the sequence control logic causes a program jump to the address specified by the jump address field of the micro instruction. If the jump condition is not satisfied, the sequence control causes the current micro-instruction address to be incremented by 1.

A sequential instruction (SEQ) is a jump instruction with the jump condition not satisfied. The reverse is true of the UJP instruction; the jump condition is forced to be satisfied. This is accomplished by making JC 0 a hardwired logical 1.

If the micro instruction register (MIR) bit 23 is a 0, and JC 0 is selected, the jump condition is not satisfied and the drive adapter executes the next micro instruction in sequence (SEQ). If MIR bit 23 is a 1 and JC 0 is selected, the jump condition is satisfied. This becomes an unconditional jump instruction (UJP).

Tables 4-2 through 4-6 specify the binary coding, mnemonics, and definitions for the M, S, D, JC, and F micro-instruction fields respectively.

To understand the drive adapter operation, comprehension of the interaction of the firmware and the hardware logic is required. The firmware is documented via the flowcharts (appendix B) and the macro-assembler program listing (appendix C).

The flowcharts are comprised of single- or double-contracting symbols which contain the mnemonic notation for the operation to be performed. Each symbol represents one micro-instruction word. A diamond symbol (figure 4-12) denotes a decision that requires a yes or no path (JMPT or JMPF). A double symbol (figure 4-13) denotes a decision and the mode field is defined as something other than 0 (such as JMPTFF or JMPSD). In the case of the double-contracting symbol shown in figure 4-13, the instruction always clears the busy flip-flop and jumps if jump condition AQROW is true (logical 1). If jump condition AQROW is false (logical 0), the next instruction is executed.

The 32 words contained in the transform jump table (Q-transform address 1E0 through 1FF) are shown in symbol form in the flowcharts. They are shown in table form in the macro-assembler listing to provide added clarity.

The macro-assembler listing provides a bit-by-bit reference for the firmware code. The micro-instruction word is assembled from two 16-bit words. The most significant eight bits of the first word is the micro address of the micro instruction in the PROM. The

micro-instruction example (figure 4-13) is shown in macro-assembler format in figure 4-14. This micro instruction has a program lable (IDLE) that is used to develop jump addresses when another micro instruction must jump to this micro instruction.

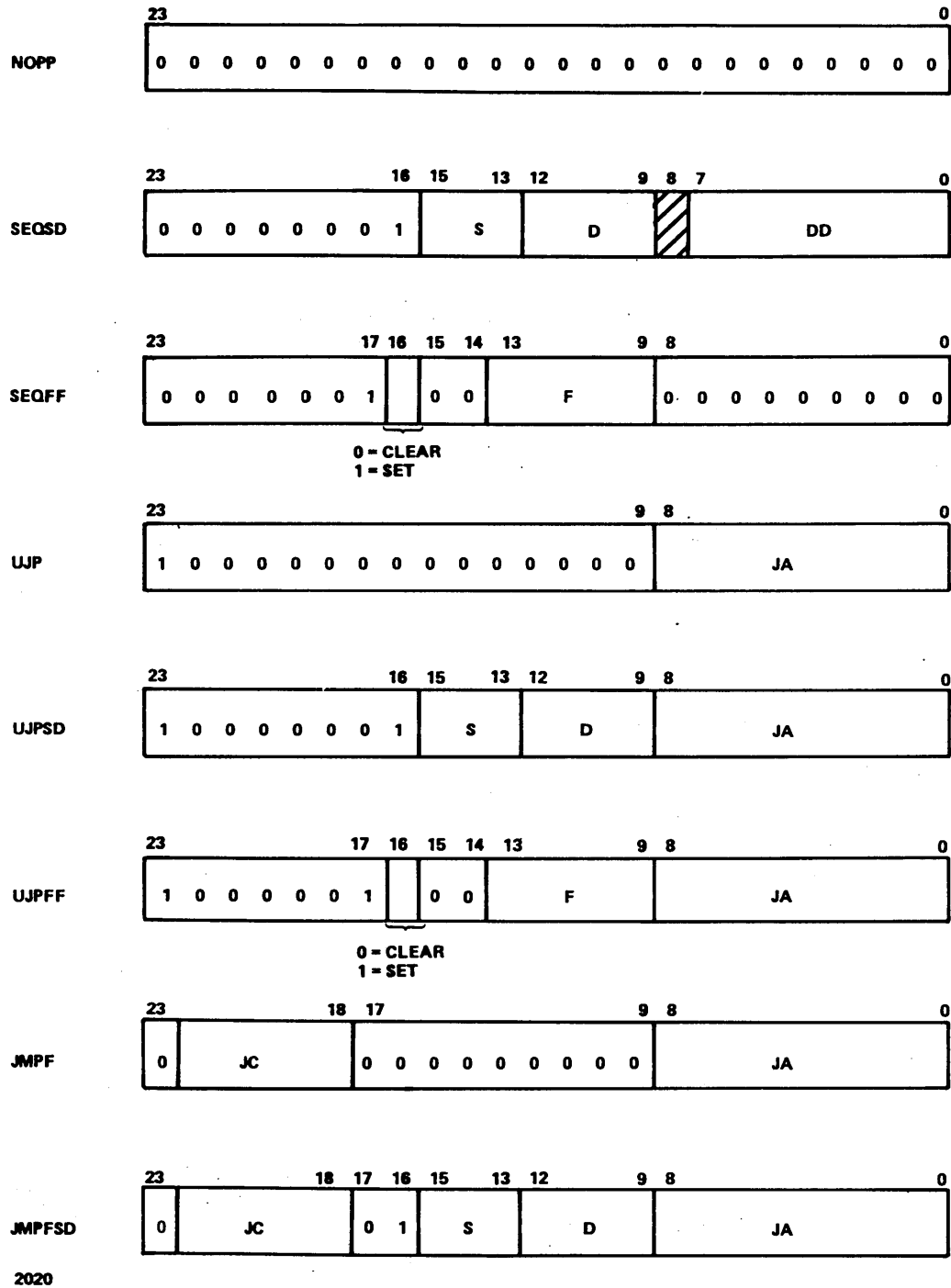
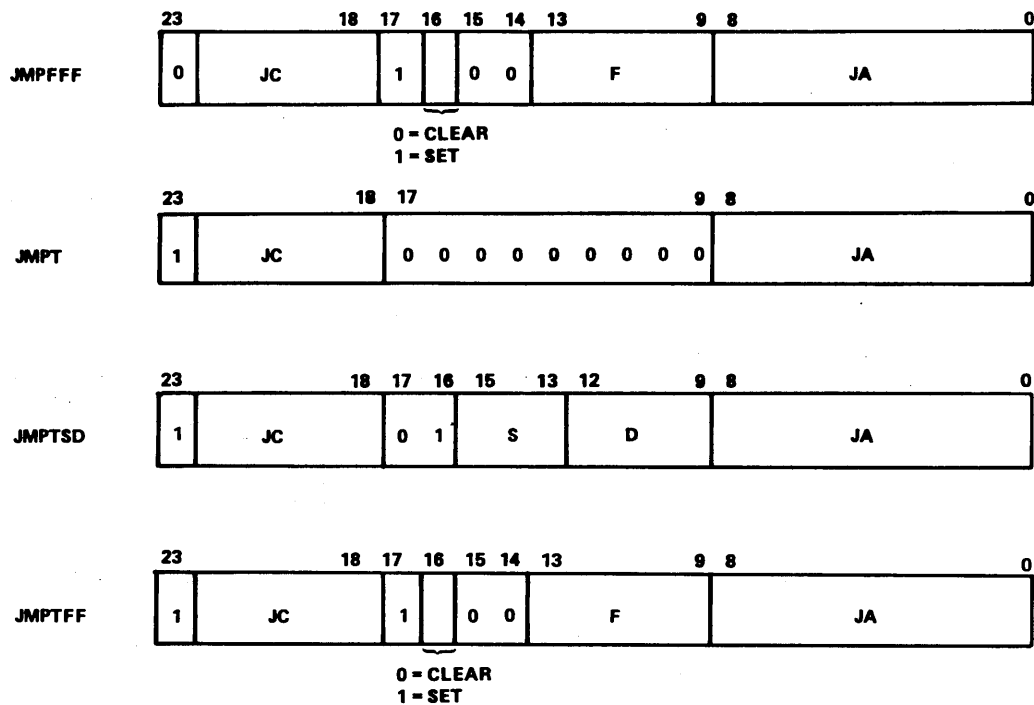


Figure 4-11. Micro-Instruction Mnemonics and Word Formats (Sheet 1 of 2)



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Figure 4-11. Micro-Instruction Mnemonics and Word Formats (Sheet 2 of 2)

TABLE 4-2. MODE CODES

MIR Bits		Mode	Definition
17	16		
0	0	No operation	No micro operation is performed; the S, D, and F fields MIR09 through MIR15 are ignored.
0	1	S/D	MIR13 through MIR15 equal the source and MIR09 through MIR12 equal the destination register address (refer to tables 4-3 and 4-4).
0	1	Strobe	MIR13 through MIR15 contain 0's (the source field is not used); the destination field (MIR09 through MIR12) contains a hexadecimal code of B, C, or D (refer to table 4-4).
1	0	Clear	MIR14 and MIR15 equal 0; MIR09 through MIR13 equal the identifier code of the flip-flop/control line to be reset (refer to table 4-6).
1	1	Set	MIR14 and MIR15 equal 0; MIR09 through MIR13 equal the identifier code of the flip-flop/control line to be set (refer to table 4-6).

TABLE 4-3. SOURCE FIELD (MODE CODE = 01 BINARY)

MIR Bits			Mnemonic	Register Name or Source
15	14	13		
0	0	0	BUSIN	Data BUSIN
0	0	1	MIR	MIR bits 0 through 7 (direct data)
0	1	0	SR1	R1 register
0	1	1	SRAM	Selected file register RAM
1	0	0	SFLR	Field length register bits 0 through 3 and MIR bits 4 through 7 combined
1	0	1	Q	Q-register bits 0 through 3
1	1	0	AL	A register lower, bits 0 through 7
1	1	1	AU	A register upper, bits 8 through 15

TABLE 4-4. DESTINATION FIELD (MODE CODE = 01 BINARY)

MIR Bits				Mnemonic	Destination Register or Strobe
12	11	10	9		
0	0	0	0	STBR1	R1 register
0	0	0	1	FLR	Field length register FLR00 through FLR07
0	0	1	0	FLRU	Field length register FLR08 through FLR12
0	0	1	1	BLL	Buffer length register, lower bits 0 through 7
0	1	0	0	BLU	Buffer length register, upper bits 8 through 15
0	1	0	1	CWAL	Current word address register, lower bits 0 through 7
0	1	1	0	CWAU	Current word address register, upper bits 8 through 15
0	1	1	1	CWAUU	Current word address register, bits 16 and 17
1	0	0	0	STBTBR	TAGBUS register
1	0	0	1	STBBOR	BUSOUT register
1	0	1	0	STBRAM	File registers selected by the contents of FLR00 through FLR03 (1 of 16)
1	0	1	1	R1INC	Increment R1 register (+1 strobe)
1	1	0	0	BLDEC	Decrement buffer length register (-1 strobe)
1	1	0	1	DMACLR	Direct memory access clear strobe
1	1	1	0	-	Not used
1	1	1	1	-	Not used

TABLE 4-5. JUMP CONDITION FIELD

MIR Bits					Mnemonic	Hardware Condition - False/True State
22	21	20	19	18		
0	0	0	0	0	HI3	Unconditional 1 (true)
0	0	0	0	1	AQROW	A/Q execute flip-flop
0	0	0	1	0	A07	A register, bit 7
0	0	0	1	1	ADRFLD	Address field (gap A) flip-flop
0	0	1	0	0	WRITE	Drive interface write flip-flop
0	0	1	0	1	LPFLAG	Loop flag flip-flop
0	0	1	1	0	TESTMD	Test mode flip-flop
0	0	1	1	1	R107	R1 register, bit 7
0	1	0	0	0	PRTMEM	A/Q operations, unprotected/protected
0	1	0	0	1	BIEVEN	BUSIN data parity, odd/even (error)
0	1	0	1	0	CE	CHECKEND interface line
0	1	0	1	1	ECCCHK	ECC check operation flip-flop
0	1	1	0	0	NEORCE	NORMALEND or check-end line
0	1	1	0	1	XFERCM	DMA transfer complete
0	1	1	1	0	ALARM	Alarm condition
0	1	1	1	1	BREMPY	FIFO data buffer register empty
1	0	0	0	0	CUSEL	Control unit selected
1	0	0	0	1	TAGVAL	TAGVALID line
1	0	0	1	0	SECTOR	Sector pulse
1	0	0	1	1	INDEX	Index pulse
1	0	1	0	0	QEQ8	Q register equal to 8
1	0	1	0	1	BLREQZ	Buffer length register equals 0
1	0	1	1	0	R1EQRAM	R1 register not/is equal to RAM
1	0	1	1	1	AUTOL	Autoload switch not/is set
1	1	0	0	0	FIFOEM	FIFO buffer empty
1	1	0	0	1	R106	R1 register, bit 6
1	1	0	1	0	FIFFUL	FIFO buffer full
1	1	0	1	1		Not used
1	1	1	0	0		Not used
1	1	1	0	1		Not used
1	1	1	1	0		Not used
1	1	1	1	1		Not used

TABLE 4-6. CONTROL FLIP-FLOP FIELD (MODE CODE = 10 or 11 BINARY)

MIR Bits					Mnemonic	Control/Status Flip-Flop or Enable Definitions
13	12	11	10	9		
0	0	0	0	0	MSREP	Reply flip-flop (set only)
0	0	0	0	1	MSREJ	Reject flip-flop (set only)
0	0	0	1	0	-	Not used
0	0	0	1	1	-	Not used
0	0	1	0	0	MSERR	Control unit error (set only)
0	0	1	0	1	MSNEED	Need control unit (set mode only)
0	0	1	1	1	MSXFER	Transfer complete
0	0	1	1	1	MSEOC	End of cylinder
0	1	0	0	0	TAGOUT	TAGOUT
0	1	0	0	1	RESP	Response
0	1	0	1	0	LPFLAG	Loop flag
0	1	0	1	1	TESTMD	Test mode
0	1	1	0	0	WRITE	Write
0	1	1	0	1	ADRFLD	Address field (gap A)
0	1	1	1	0	READ	Read
0	1	1	1	1	AUTOLD	Autoload enable
1	0	0	0	0	BUSY	Busy
1	0	0	0	1	DMAGO	Direct memory access go
1	0	0	1	0	PROTEC	Program protect bit
1	0	0	1	1	PRTSYS	Disable CPU protect system
1	0	1	0	0	R1TOA	Enable R1 register to A register
1	0	1	0	1	ECCCHK	ECC check operation
1	0	1	1	0	RIMSB	Inhibit output of R1 bit 7
1	0	1	1	1	ALRMST	Alarm status
1	1	0	0	0	-	

†Set/reset condition of flip-flops may be tested by conditional jump instructions.

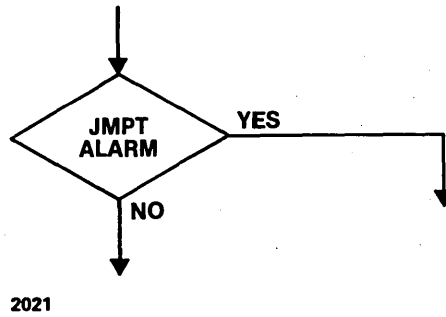


Figure 4-12. Single Contracting Symbol

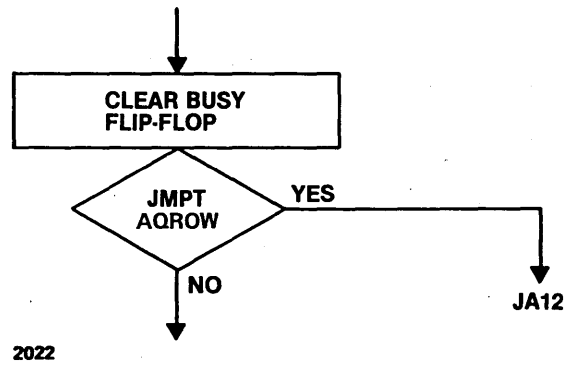


Figure 4-13. Double Contracting Symbol

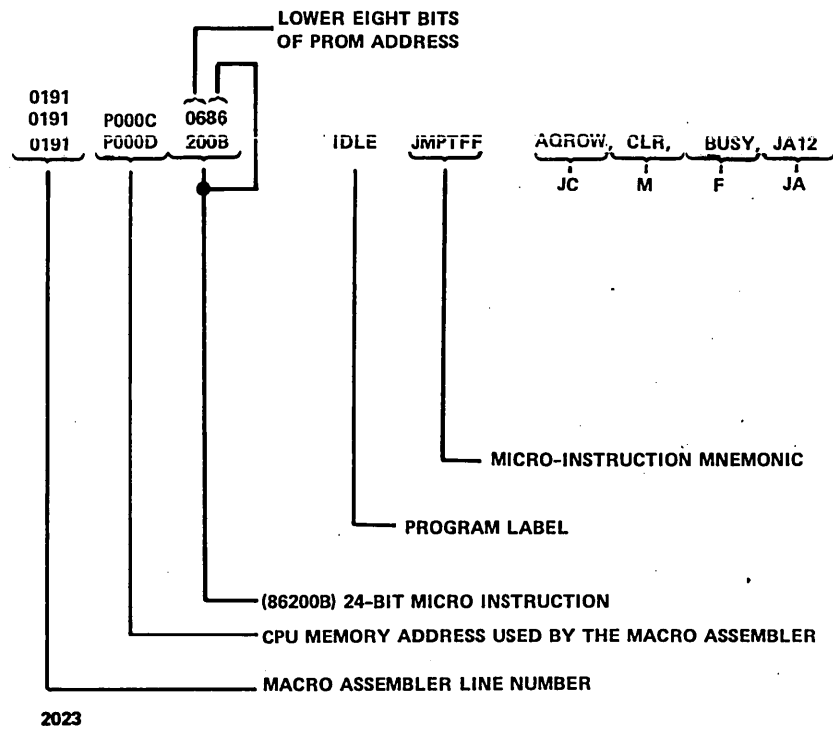


Figure 4-14. Macro-Assembler Format

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This section contains the drive adapter logic diagrams, the drive adapter backplane adapter paddle board wiring diagram, and a brief page-by-page description of the logic diagrams.

LOGIC DIAGRAM DESCRIPTION

The following logic diagram description provides a general overview of the logic elements for each sheet of the logic diagrams. The sheets are referenced by the last three digits of the sheet cross-reference designation. The sheet cross reference designation is the four digit number directly below the logic diagram drawing number block. To understand the logic diagram description, the reader should be familiar with the general theory of operation and the block diagram description contained in section 4.

SIGNAL/PIN/CROSS-REFERENCE

This sheet is used for cross-reference between edge pin numbers, the logic sheets, and signals that are present at the edge pins.

BLOCK DIAGRAM

This sheet shows the major blocks of hardware logic with each block referring to a logic sheet.

SHEET 101

Logic sheet 101 contains the micro-address multiplexer, micro-address registers, control memory, and page flip-flop logic elements.

The 512 words of control memory are separated into two pages of 256 words each. The page flip-flop selects which page of the control memory to operate in. The page flip-flop can only be clocked to the desired state; it cannot be incremented from a 0 to a 1. This forces the firmware always to perform a jump to cross the page boundary. It cannot use a sequential instruction to cross the page boundary.

The control memory has four noninverting buffers on its output bits (MIR13 through MIR16). The buffers are used to reduce the loading, caused by the high number of circuit inputs, attached to these outputs.

The four-input NAND gate, fed by bits MIR05 through MIR08, is a coder to switch the control memory address multiplexer during a Q-transform operation.

A clear controller or master clear command sets the control memory address register to 0 so that the firmware starts execution at micro-address 0.

SHEET 102

Logic sheet 102 contains the select active propagation relay, control flip-flops 8 through 17, and the select and TAGBUS control transmitters.

The select active propagation relay is on the backplane adapter paddle board and depicted for reference only. The relay is used to propagate the select active signal to drive adapter 1 if CPU 0 loses +5V dc power, or if drive adapter 0 is removed for maintenance. This propagation allows drive adapter 1 to continue operating undisturbed.

The control flip-flops are set when the master clock is in a low state. The control flip-flops are divided into three groups of eight as specified by the control flip-flop decoder. Group 0 through 7 is individual flip-flops located on logic sheets 103, 105, 120, and 121. Group 8 through 15 and group 16 through 23 are eight-bit addressable latches addressed by the F and M fields.

SHEET 103

Logic sheet 103 contains the master clock, the control flip-flops 0 through 7 decoder, the destination strobes, and the end-of-cylinder and transfer complete flip-flops.

The master clock consists of a 20.2752 megahertz hybrid oscillator which is divided by the first two stages of the clock counter. The net result is a free-running clock signal with a period of 197 nanoseconds.

Figure 5-1 illustrates the timing relationships of the clock counter (B4) outputs when a DMACLR signal is issued by the firmware. The CLK signal at B8-8 is an OR function of low levels from the two low-order outputs of the clock counter (signals B4-14 and B4-13). The two high-order outputs of the counter normally are not allowed to count up due to the presence of the counter load signal. The load signal is coincident with CLK + propagation delay provided the CLRFFIFO flip-flop is not set (signals B8-6, B4-12, and B4-11).

When a DMACLR signal is active the CLRFFIFO flip-flop sets on the next positive transition of the oscillation (Time T7). This blocks any load inputs to the counter, allowing the two high-order outputs to count up. When outputs B4-11 and B4-13 are both high, the following positive transition of the oscillation resets the CLRFFIFO flip-flop (Time T18). The result is a 535-nanosecond delay of the CLRFFIFO signal. A minimum delay of 300 nanoseconds is required to clear the FIFO flip-flop.

The CLRDA signal can result from a manual master clear or a software-issued clear controller function. Figure 5-2 illustrates the CLK signal characteristics as a result of CLRDA. A software-issued clear controller command generates a CLRDA that is synchronous with the master clock. The S-R latch (D5) allows one more negative transition of the clock before locking it high. This extra clock pulse is required to provide a REPLY to the CPU.

A CLRDA signal generated by a manual master clear is not synchronous with the master clear and may, or may not, allow one more clock pulse before locking the counter high. However, the additional clock pulse is not required in this case.

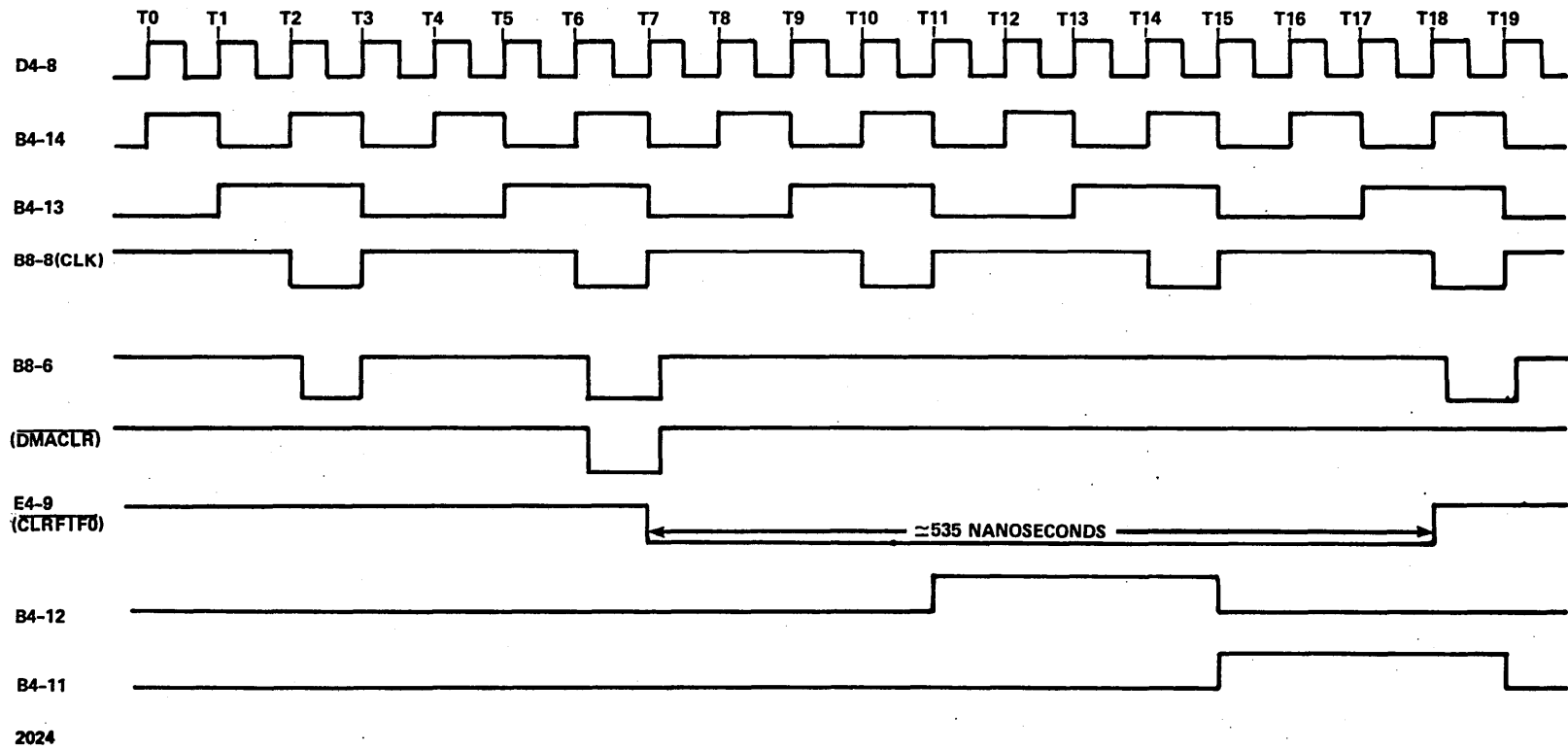


Figure 5-1. Module Drive Adapter, Basic Timing

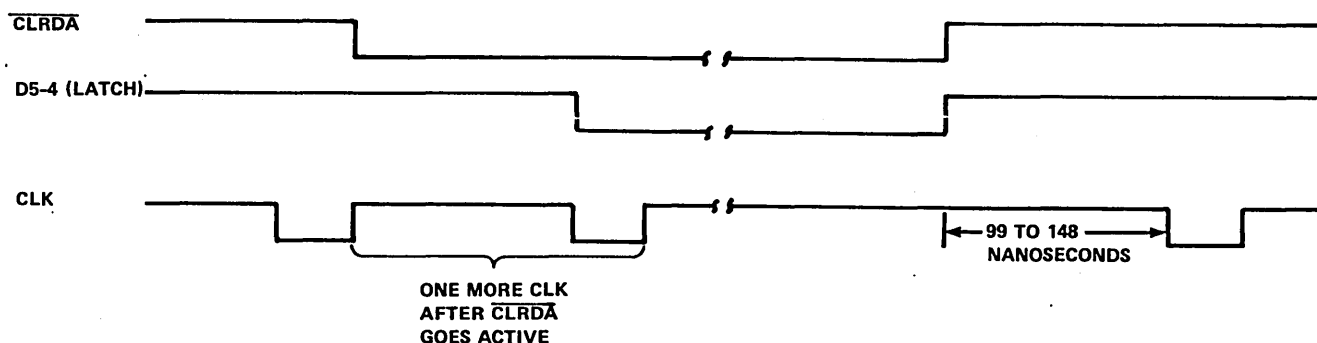


Figure 5-2. Module Drive Adapter, Clear Drive Adapter Timing

The CLRCLKCTR/ and EXCLK input lines are used by the PWA test device only. The CLK/TEST jumper should be in the CLK position for normal use in a CPU environment.

Control flip-flops 2 and 3 and destination strobes 14 and 15 are not used. Destination strobes R1 increment (R1INC), buffer length decrement (BLDEC), and DMA clear (DMACLR) do not load registers as do the other destination strobes. These strobes are used to increment the count of the R1 register by 1, decrement the count of the buffer length register by 1, and clear the FIFO/DMA control logic, FIFO buffer memory, and autoloader flip-flop.

SHEET 104

Logic sheet 104 contains the autoloader flip-flop, jump condition latch, jump condition multiplexer, and jump true/false logic circuitry.

The autoloader flip-flop is set by either a logic level pulse of any duration greater than 100 nanoseconds or a form C (SPDT) switch. The firmware waits for the autoloader signal to drop before initiating the autoloader sequence. In the case of a logic level pulse, the autoloader flip-flop is cleared at the entry into the autoloader sequence by destination strobe DMACLR.

The jump condition latch samples its input lines every master clock period. The latch is used to synchronize any events that occur asynchronously to the drive adapter.

The jump condition multiplexer consists of two 16-to-1 multiplexers whose outputs are ORed and applied to the jump true/false exclusive OR gate. The true/false state of MIR23 determines if the jump condition is satisfied.

SHEET 105

Logic sheet 105 contains the A/Q-interface receivers, equipment code comparator, control logic, read/write flip-flop, and the reply and reject flip-flops.

The A/Q-interface control logic is contained entirely within the A/Q-FPLA. (Refer to appendix D and programmed logic arrays in section 4.) The A/Q-read/write flip-flop is used to synchronize the drive adapter to the CPU A/Q command.

The reply and reject flip-flops are clock set only by director function or status commands. In all other cases

the flip-flops are set by decoder signals MSREP/ and MSREJ/ respectively. The flip-flops are clock cleared when the A/Q-I/O command drops.

SHEET 106

Logic sheet 106 contains the clear drive adapter director function and interrupt function decoders, the interrupt enable latch, and the seek-end and alternate drive adapter flip-flops.

The clear drive adapter and clear interrupt functions are decoded from A-register bits 0 and 1 respectively. The clear interrupt function clears the interrupting condition and all enables. The CLRICO/ signal, generated in the A/Q-FPLA on logic sheet 105, clears only the interrupting condition and does not effect the interrupt enables. All enabled interrupts are wire-ORed on the PWA to provide the CPU-hardware macro interrupt and the drive adapter interrupt active status signals.

SHEET 107

Logic sheet 107 contains the TAGBUS register, TAGPARITY generator, TAGBUS transmitters and BUSIN parity checker.

Odd parity is used on the TAGBUS, BUSOUT, and BUSIN interfaces. The BUSIN parity is sampled in two ways. With tag commands, firmware samples the BUSIN EVEN signal, which is true when a parity error exists. With data or address field transfers, hardware checks the parity by clocking the control unit error flip-flop (CUERR, logic sheet 121) as each address or data byte is sent to the drive adapter.

SHEET 108

Logic sheet 108 contains the BUSOUT multiplexer, register, parity generator and transmitters. Operation of the BUSOUT multiplexer is described in section 2.

The BUSOUT register is transparent during data transfers to the disk via the WRITE and DMAGO (WRTGO) signal. The bus select (BUSSEL/) signal determines which half of the 16-bit word is sent to the disk.

SHEET 109

Logic sheet 109 contains the A-register receivers and the internal bus multiplexer.

Input 4 to each of the 8 multiplexers is significant. The lower four bits of the field-length register is input to IB00 through IB03. Bits MIR04 through MIR07 are input to IB04 through IB07. By combining these two four-bit bytes, the drive adapter sends the read/write BUSOUT modifier and the residue byte count to the control unit. (Refer to table 4-1 and the Field Length Register subheading in section 4.)

SHEET 110

Logic sheet 110 contains the lower 16 bits of the current word address register (CWAR) and the transmitters. CWAR is loaded by two separate A/Q-output commands, which transform into three destination strobes, to load the register eight bits at a time. CWAR is incremented by 1 on the trailing edge of each drive adapter memory cycle by signal DMA1-RA/. The transmitters are enabled by signal MCA/, the result of double-buffering signal DMA1-RA/.

The upper 4 bits of the 20-bit memory address are located on logic sheet 111.

SHEET 111

The FIFO fullness counter is shown on logic sheet 111. This counter keeps track of the number of 16-bit words contained in the FIFO. The counter is incremented by signal IFIFO/ for every word entered in the FIFO and decremented by OFIFO for every word removed. Two status words are available from the FIFO fullness counter; FIFO full (FIFOFULL) and FIFO empty (FIFOEMPTY). These words are used to allow the FIFO to empty at the completion of a read transfer and to empty or fill when an end-of-cylinder condition is detected.

When a simultaneous enter and removal of words from the FIFO occurs, logic circuitry (on logic sheet 118) blocks both an in and out count (a do-nothing state). The FIFO logic, on sheet 118, consists of FIFO control one shots, the FIFO control shift register, and DMA2 FPLA.

SHEET 112

Logic sheet 112 contains the FLR, FLR 0 detect flip-flop, and FLR less than or equal to detection logic. The FLR is a 13-bit register that allows the disk drive to operate with a minimum of four sectors per track. The FLR is decremented for each byte transferred on the trailing edge of signal DMASIN/ (DMASYNINCIN). The FLR 0 detect flip-flop is set when the FLR underflows (a count of FFF). Refer to the FLR description in section 4.

SHEET 113

Logic sheet 113 contains the FIFO input multiplexer and the FIFO. The FIFO multiplexer input is the BUSIN data for read operations, and DMA data from memory for write operations.

The FIFO is comprised of four integrated circuits, each four bits wide and 64 words deep. INPRA through INPRD (input ready) and OUTRA through OUTRD (output ready)

are the FIFO status signals. INPRx indicates that a location is available at the FIFO input. OUTRx indicates that a word is ready at the FIFO output. These status signals are used by the FIFO/DMA control logic.

SHEET 114

Logic sheet 114 contains the FIFO data buffer and DMA data-to-memory (DTM) transmitters. The FIFO data buffer is loaded 16 bits at a time for both read and write transfers. For a read, data is transferred to memory via the DTM transmitters. For write operations, the two output data bytes are multiplexed by the BUSOUT multiplexer.

SHEET 115

Logic sheet 115 contains the drive adapter file (RAM) and the RAM/R1 register comparator. The drive adapter file is loaded in either of two ways. The destination strobe (STBRAM/) generated by the firmware controls one method. The second method is hardware controlled when reading the address fields prior to performing a data transfer. During each SYNCIN (DMASIN), the drive adapter file is loaded with the address field byte present on BUSIN. The test signal (TESTGO) prevents data from being entered into the drive adapter file during either the actual data transfer or the data field ECC check function.

The R1MSB signal, which feeds the RAM/R1 comparator, is used to mask the last sector bit when comparing the target sector to the actual sector.

SHEET 116

Logic sheet 116 contains the buffer length register (BLR) and the R1 register.

The BLR 0 detect signal operates in the same manner as the field length register 0 detect signal; when the counter underflows (count equal to FFFF) the BLR equal to 0 flip-flop is set. The A/Q-output command, load buffer length, loads the actual number of words into the BLR. The firmware then decrements the BLR by 1 via the destination strobe (BLDEC/). This allows the BLR to underflow when the correct number of words have been processed.

SHEET 117

Logic sheet 117 contains the DMA1 FPLA, DMA control logic, FIFO input byte flip-flop and lost data flip-flop. The logic operations performed by the DMA1-FPLA (output terms) are as follows:

- Decrement the buffer length register (pin 18)
- Clear the FIFO data buffer (pin 17)
- Shift-in strobe to the upper byte (second half) of FIFO (pin 16)
- Shift-in strobe to the lower byte (first half) of FIFO (pin 15)
- Clock-set the DMA memory request flip-flop (pin 13)

- Toggle the input data byte flip-flop (pin 12)
- Present the lost data condition to the lost data flip-flop (pin 11)
- Present the transfer complete condition to the transfer complete flip-flop (pin 10)

Refer to appendix D for the complete contents of DMA1 FPLA.

The lost-data condition is always referenced to the disk drive and indicates that the drive adapter and/or the CPU memory was unable to maintain the required data rate. During a read-from-disk operation, DMA1 FPLA samples the input ready status from the FIFO half specified by the input data byte flip-flop. If this status is false and a SYNCIN signal is received, a lost-data condition exists. During a write-to-disk operation, DMA1 FPLA samples the FIFO data buffer full (BRFULL) flip-flop (located on sheet 118). If this status is false and a SYNCIN signal is received, a lost-data condition exists.

The following conditions must be met for a transfer complete condition when transferring either to or from the disk:

- Buffer length register equal to 0
- Field length register equal to 0
- FIFO empty
- FIFO data buffer register empty

For test mode data transfers only, the buffer length register equal to 0 condition is necessary for a transfer complete condition.

SHEET 118

Logic sheet 118 contains the DMA2 FPLA, FIFO output control logic, FIFO output byte flip-flop, and FIFO data buffer register full flip-flop. The operations performed by the DMA FPLA (output terms) are as follows:

- Increment the FIFO fullness counter (pin 18)
- Decrement the FIFO fullness counter (pin 17)
- Provide the byte select code to the BUSOUT multiplexer (pins 13 and 16)
- Toggle the FIFO output data byte flip-flop (pin 15)
- Clock the lost data flip-flop (pin 12)
- Clock the FIFO data buffer register full flip-flop (pin 11)
- Clock the control unit error flip-flop located on sheet 121 (pin 12)

When the first word loaded into the FIFO becomes available at the output, the four output ready signals from

the FIFO integrated circuits are ANDed together. This signal triggers the shiftout one shot if the FIFO data buffer register is empty and the shiftout delay one shot is not active. The shiftout signal unloads one word from the FIFO, loads the FIFO data buffer and sets the data buffer register full flip-flop.

When the data buffer register full flip-flop sets, the memory request flip-flop sets if a read transfer is in progress. During a write transfer the drive adapter waits for the first SYNCIN to be received from the control unit. During a read transfer when the memory cycle is complete, the master clear adapter (MCA/) signal clears the data buffer register full flip-flop. During write transfers when the second byte of each word is sent to the control unit, the DMASIN signal clears the data buffer register flip flop.

The shiftout delay one shot prevents false shiftouts that would otherwise result, since the output ready signals remain active for a period following each shiftout.

SHEET 119

Logic sheet 119 contains the A-register multiplexer and transmitters. The select bits of the A-register are decoded in the A/Q-FPLA located on logic sheet 105.

The transmitters are open collector and not gated with an enable signal. By selecting input 3 for bits RD01/ through RD08/ and disabling the multiplexer for bits RD09/ through RD16/, the output of the transmitters is in the high state to prevent loading of the RDxx lines when the drive adapter is inactive.

SHEETS 120 AND 121

Logic sheets 120 and 121 contain the control unit select logic, control unit release logic, and drive adapter alarm conditions. The drive adapter alarm conditions are located on logic sheet 121. The following six conditions can set the alarm condition:

- Forced release
- Control unit error
- Lost data
- Memory protect fault
- Memory address error
- Memory parity error

The alarm condition is recirculated back to the memory-error latch. This latch is enabled during each memory cycle, but if an error occurs, the input to the latch is disabled. This allows the FIFO to fill or empty, as required, without disturbing the error condition. (See also figures 5-3, 5-4, 5-5.)

TD-1A

SIGNAL			SIGNAL			SIGNAL			SIGNAL		
SIGNAL	PIN	CON	SIGNAL	PIN	CON	SIGNAL	PIN	CON	SIGNAL	PIN	CON
AD01/	280	0105	DMA-DTM12/	75	0114	RD11/	231	0119			
AD02/	247	0105	DMA-DTM13/	76	0114	RD12/	234	0119			
AD03/	246	0105	DMA-DTM14/	77	0114	RD13/	236	0119			
AD04/	245	0105	DMA-DTM15/	78	0114	RD14/	239	0119			
AD08/	281	0105	DMA-DTM16/	79	0114	RD15/	241	0119			
AD09/	282	0105	DMA-MAB20/	259	0111	RD16/	244	0119			
AD10/	283	0105	DMA-MAB01/	53	0110	READ-SSTB/	248	0105			
AD11/	284	0105	DMA-MAB02/	154	0110	RECYCLE	88	0112			
			DMA-MAB03/	55	0110	REJECT/	220	0105			
ALERT0	9	0106	DMA-MAB04/	56	0110	REPLY/	216	0105			
ALERT1	10	0106	DMA-MAB05/	57	0110	RESPONSE	96	0102			
			DMA-MAB06/	58	0110	RPINTXX1/	249	0106			
BUSIN0	13	0107	DMA-MAB07/	59	0110						
BUSIN1	14	0107	DMA-MAB08/	60	0110	SD01/	203	0109			
BUSIN2	12	0107	DMA-MAB09/	61	0110	SD02/	205	0109			
BUSIN3	15	0107	DMA-MAB10/	62	0110	SD03/	207	0109			
BUSIN4	23	0107	DMA-MAB11/	253	0110	SD04/	209	0109			
BUSIN5	22	0107	DMA-MAB12/	254	0110	SD05/	211	0109			
BUSIN6	17	0107	DMA-MAB13/	255	0110	SD06/	215	0109			
BUSIN7	18	0107	DMA-MAB14/	256	0110	SD07/	219	0109			
BUSPARIN	21	0107	DMA-MAB15/	257	0110	SD08/	223	0109			
			DMA-MAB16/	258	0110	SD09/	225	0109			
BUSOUT0	297	0108	DMA-MAB17/	35	0111	SD10/	228	0109			
BUSOUT1	298	0108	DMA-MAB19/	47	0111	SD11/	230	0109			
BUSOUT2	296	0108	DMA-MAB/	263	0117	SD12/	233	0109			
BUSOUT3	299	0108	DMA-MOS/	262	0117	SD13/	235	0109			
BUSOUT4	91	0108	DMA-MPE/	252	0121	SD14/	238	0109			
BUSOUT5	94	0108	DMA-PFLT1/	237	0121	SD15/	240	0109			
BUSOUT6	92	0108	DMA-PRDT/	232	0117	SD16/	243	0109			
BUSOUT7	93	0108	DMA-RA/	261	0110						
BUSOUTPAR	87	0112	DMA-WRITE/	63	0117	SECTOR	8	0121			
			DMA-MAB18/	36	0111						
CHECKNO	5	0121	DMA-MR/	260	0117	SELECTIN	19	0120			
CLCLKCTR/	27	0103	DMA-MAB18/	47	0111	SELECTOUT	20	0102			
DFM01	264	0113	ENPRYSIS	293	0102						
DFM02	265	0113	EXTCLK	26	0103	SELHOLD0	98	0120			
DFM03	266	0113	GND	3	0107	SELHOLD1	99	0120			
DFM04	267	0113	GND	25	0107						
DFM05	268	0113	GND	81	0107	SHGND	43	0104			
DFM06	269	0113	GND	101	0107	SHNC	45	0104			
DFM07	270	0113	GND	102	0107	SHNB	42	0104			
DFM08	271	0113	GND	301	0107						
DFM09	272	0113	GND	302	0107	SYNCIN	24	0117			
DFM10	273	0113				SYNCOUT	90	0112			
DFM11	274	0113	INDEX	6	0121						
DFM12	275	0113	INTD0	11	0106	TAGH050	86	0107			
DFM13	276	0113	INTD1	16	0106	TAGH051	87	0107			
DFM14	277	0113				TAGH052	84	0107			
DFM15	278	0113	MR	46	0106	TAGH053	83	0107			
DFM16	279	0113	NORMALEND	7	0121	TAGH054	89	0112			
			PRG PRGT	291	0105	TAGOUT	95	0102			
						TAGVAL ID	4	0104			
DMA-DTM01/	64	0114	RD01/	204	0119	NEO	292	0105			
DMA-DTM02/	65	0114	RD02/	206	0119	WRITE/	290	0105			
DMA-DTM03/	66	0114	RD03/	208	0119						
DMA-DTM04/	67	0114	RD04/	210	0119	+5VDC	1	0107			
DMA-DTM05/	68	0114	RD05/	214	0119	+5VDC	2	0107			
DMA-DTM06/	69	0114	RD06/	218	0119	+5VDC	201	0107			
DMA-DTM07/	70	0114	RD07/	221	0119	+5VDC	202	0107			
DMA-DTM08/	71	0114	RD08/	224	0119						
DMA-DTM09/	72	0114	RD09/	226	0119						
DMA-DTM10/	73	0114	RD10/	229	0119	-12VDC	51	0107			
DMA-DTM11/	74	0114									

NOTES: UNLESS OTHERWISE SPECIFIED

1. SPARE GATES

7414 2 AT G12
 7405 2 AT H7
 74S20 1 AT K6
 9602 1 AT F3

2. SOME CIRCUIT ELEMENTS SHOW VENDOR NUMBER WITHOUT (74) PREFIX.

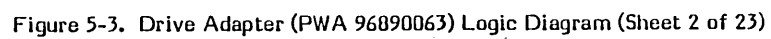
INTER-DIVISIONAL DOCUMENT
 Changes to this document require
 approval of all Using Divisions
 per CDC-STD 1.01.024.

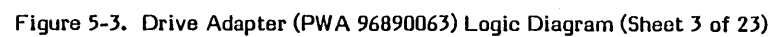
LOGIC TYPE

BIPST

GSD CONTROL DATA CORPORATION		DATA SYSTEMS LA JOLLA DIVISION LA 22-34, ON ROAD		TITLE	
FIRST USED ON		6D145 3 5		LOGIC- MODULE DRIVE ADAPTER	
OR	2-11-81	2-11-81		2-11-81	
CHK	2-11-81	2-11-81		2-11-81	
ENGR	2-11-81	2-11-81		2-11-81	
APPD	2-11-81	2-11-81		2-11-81	
C		09132		96890064	
96890063		SHEET		1 OF 23	

Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 1 of 23)





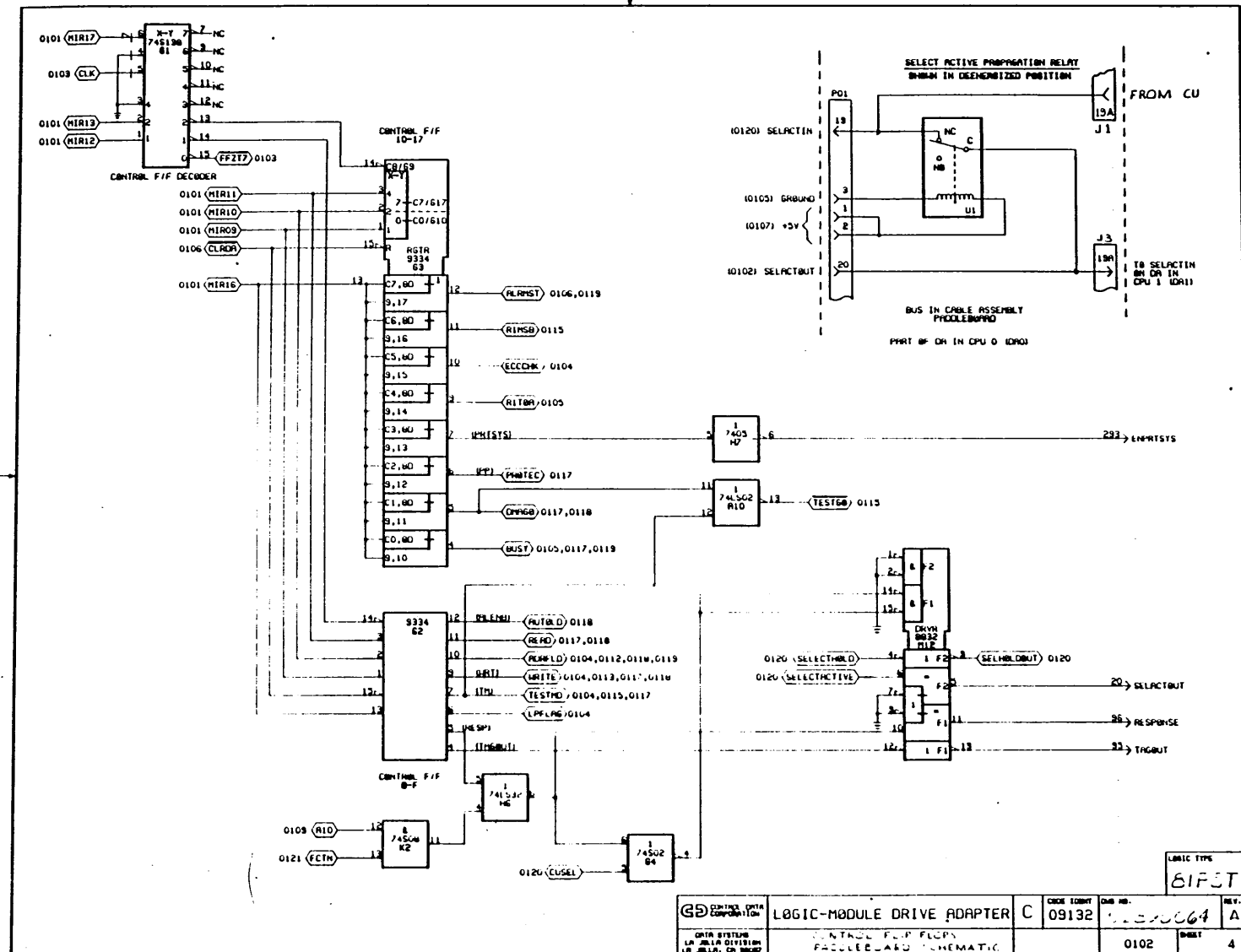
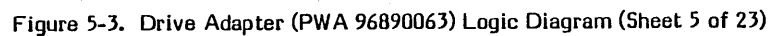
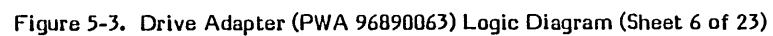
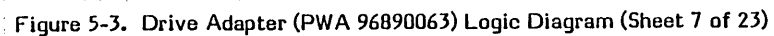
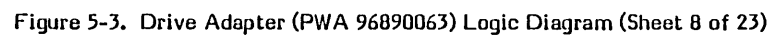


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 4 of 23)









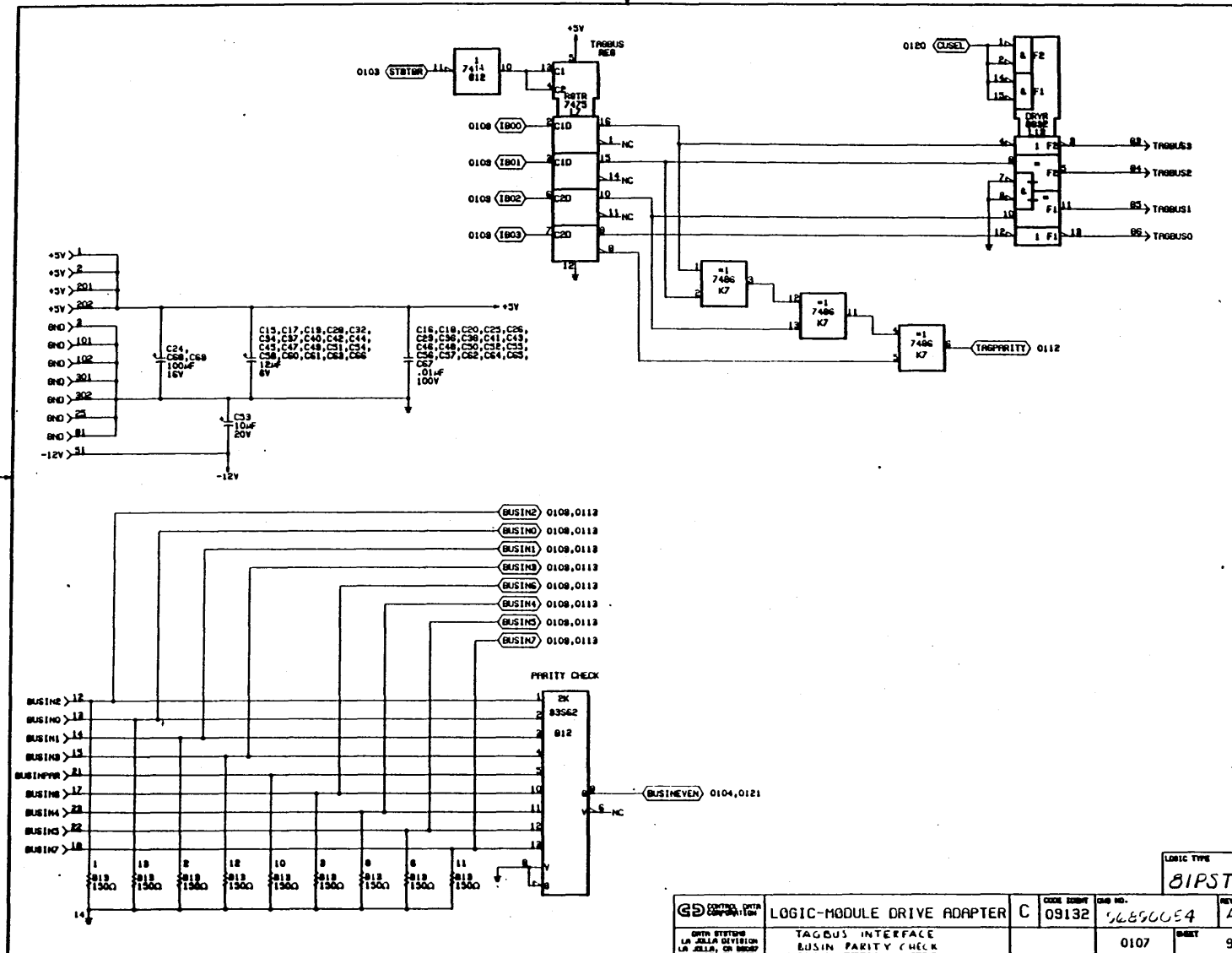
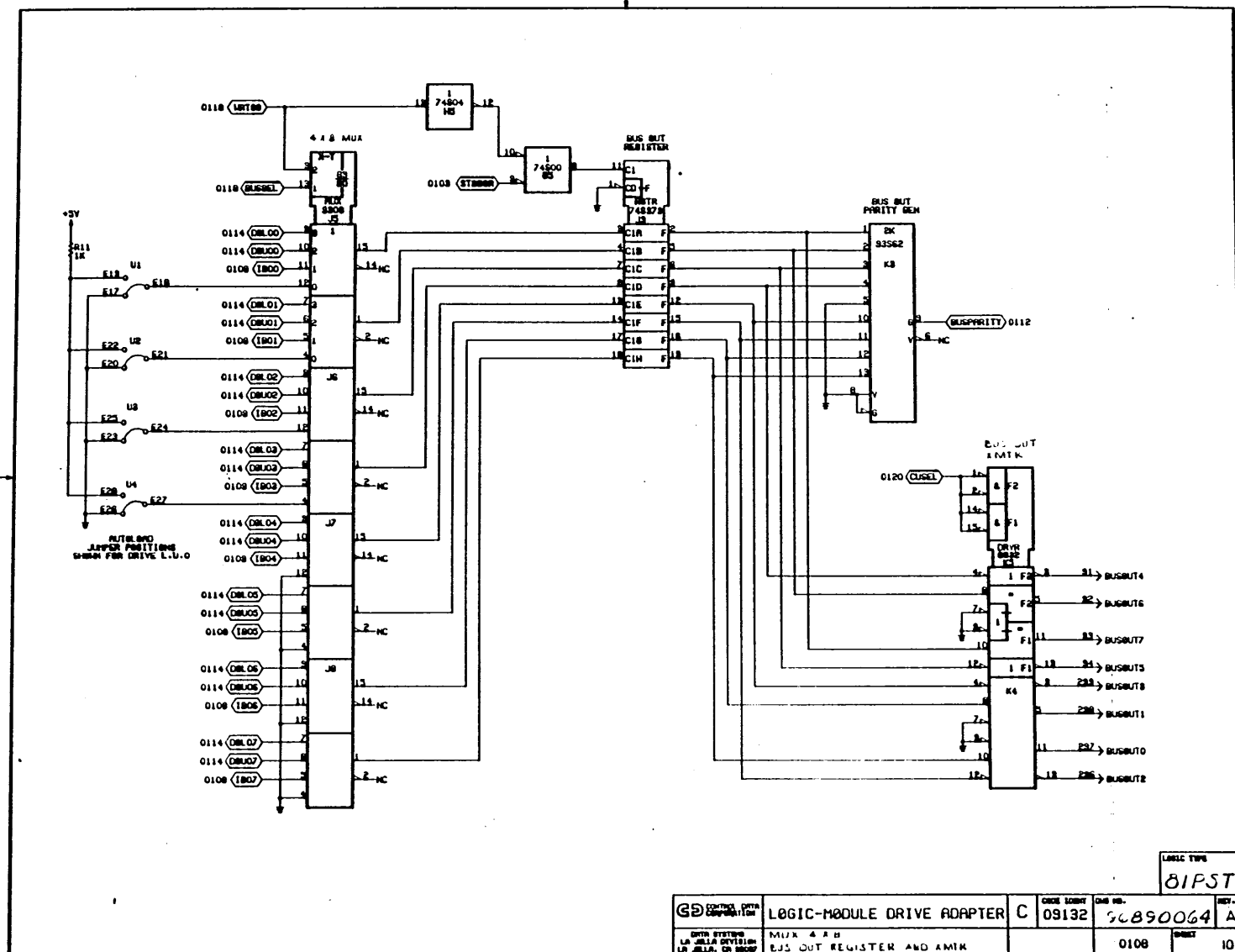
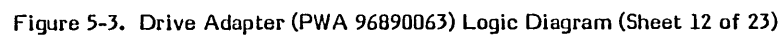


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 9 of 23)





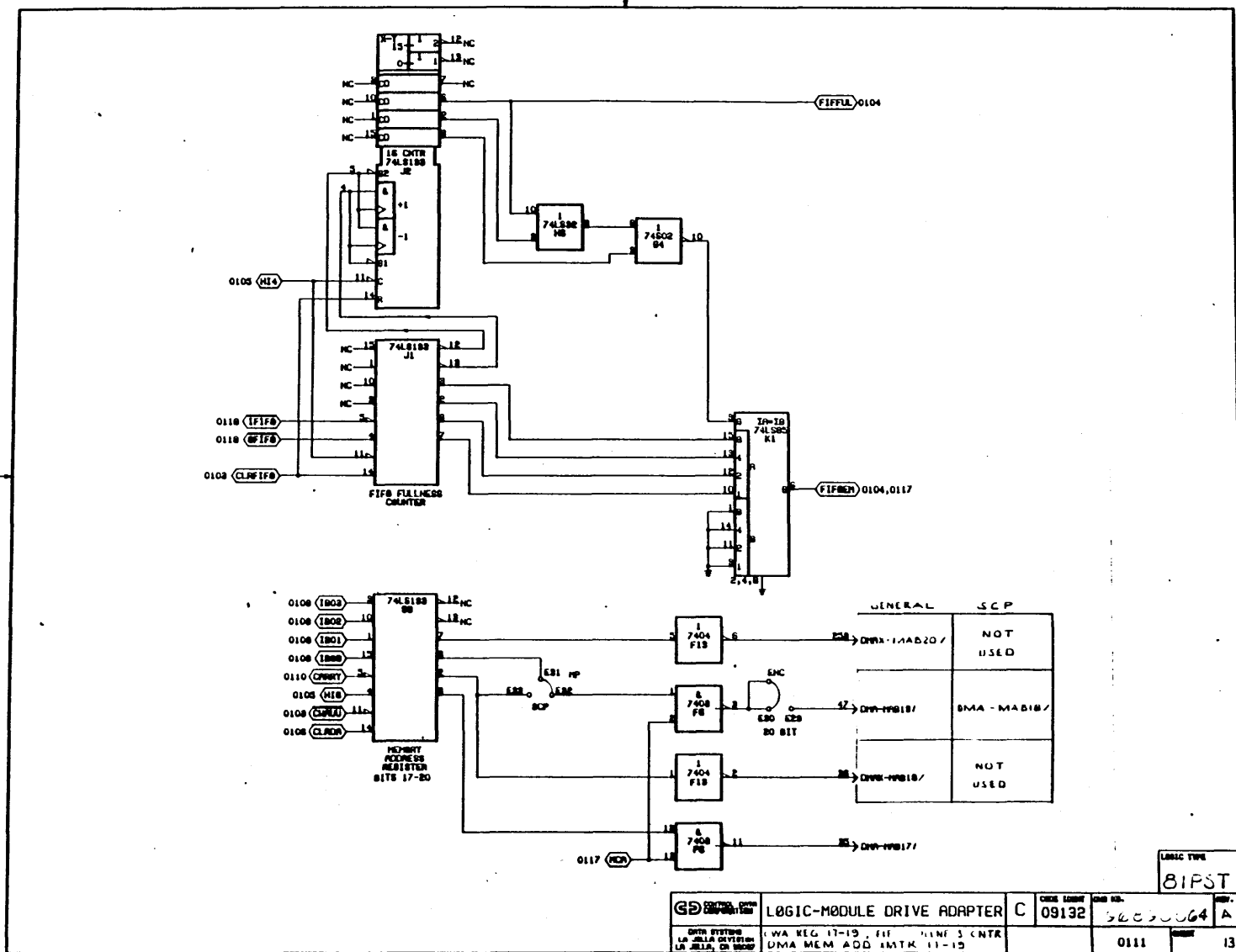
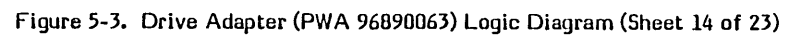
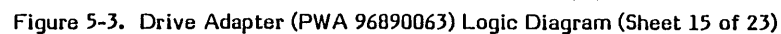


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 13 of 23)





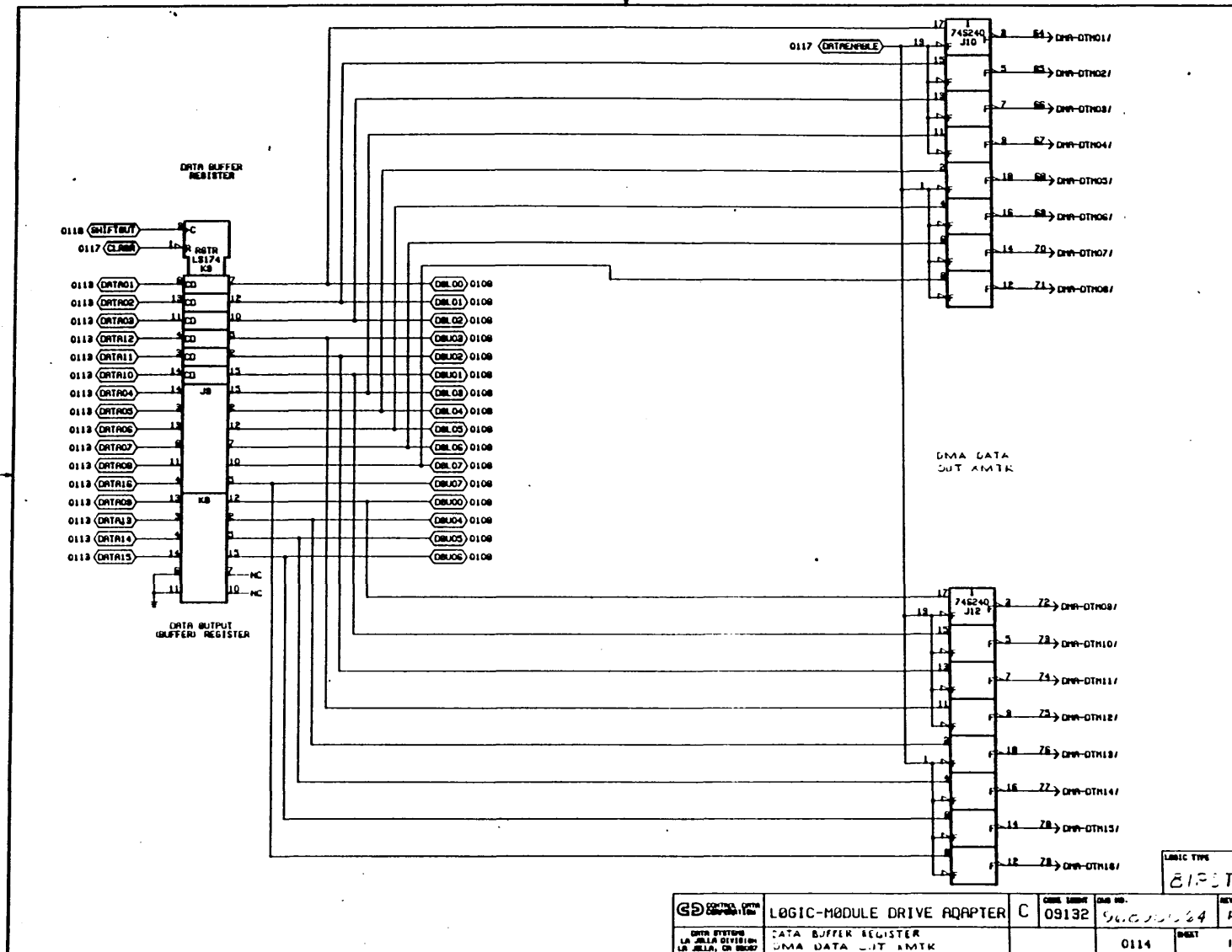
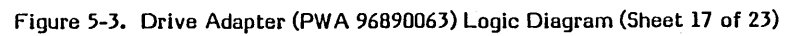
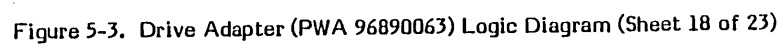


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 16 of 23)





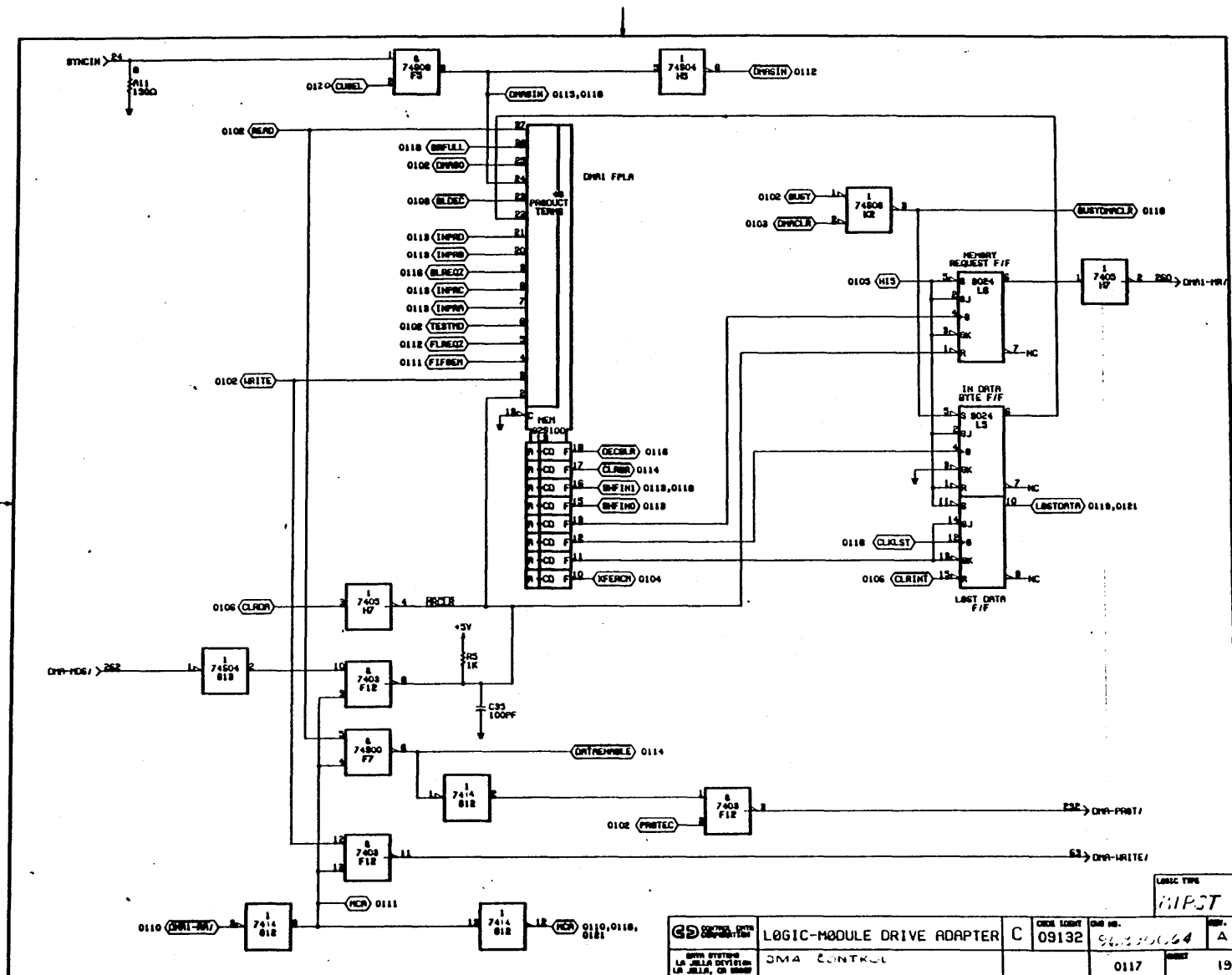


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 19 of 23)

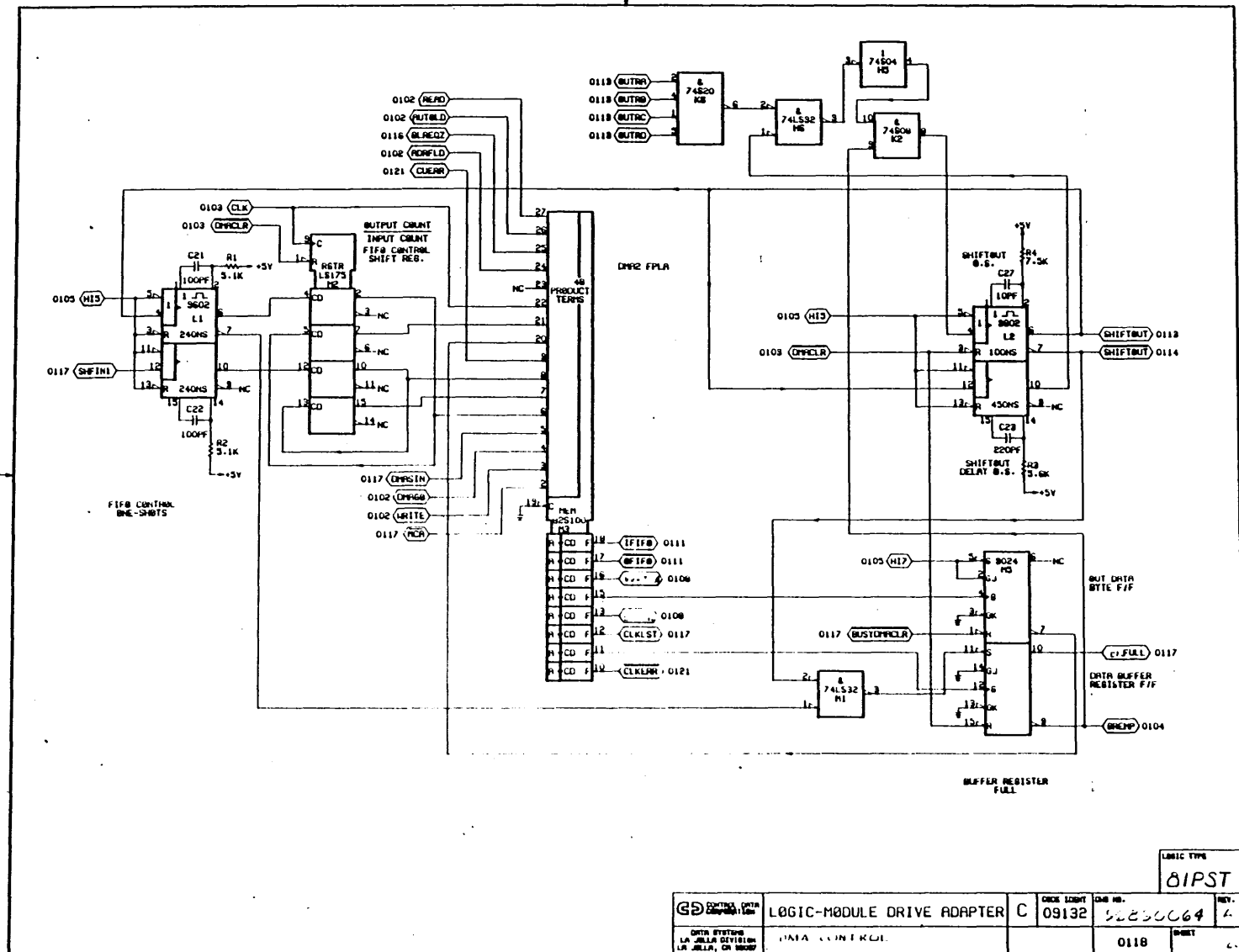
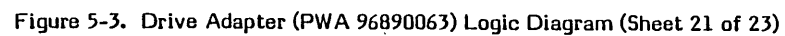


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 20 of 23)



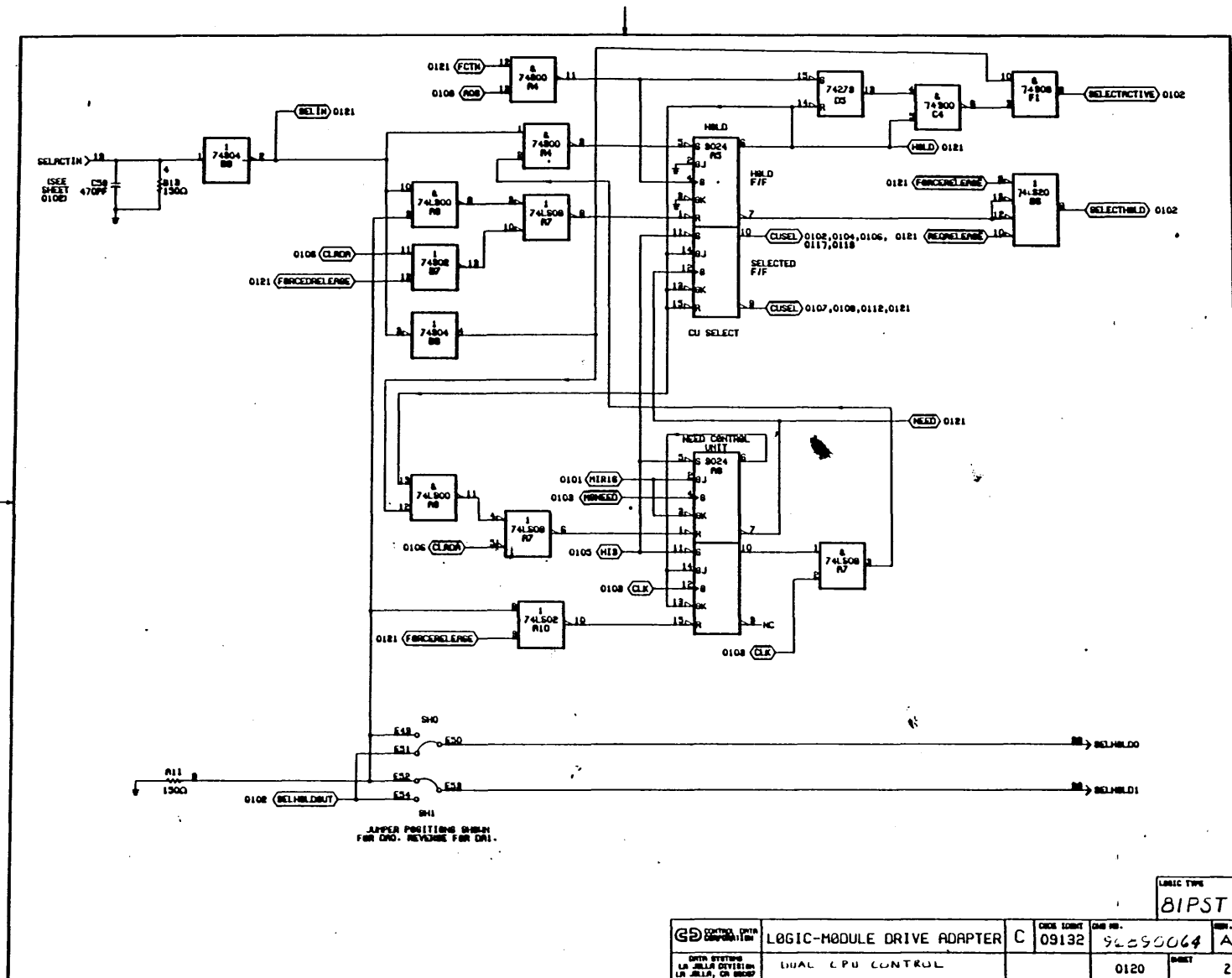


Figure 5-3. Drive Adapter (PWA 96890063) Logic Diagram (Sheet 22 of 23)

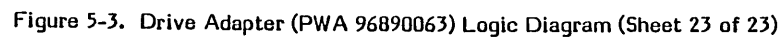


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 1 of 22)

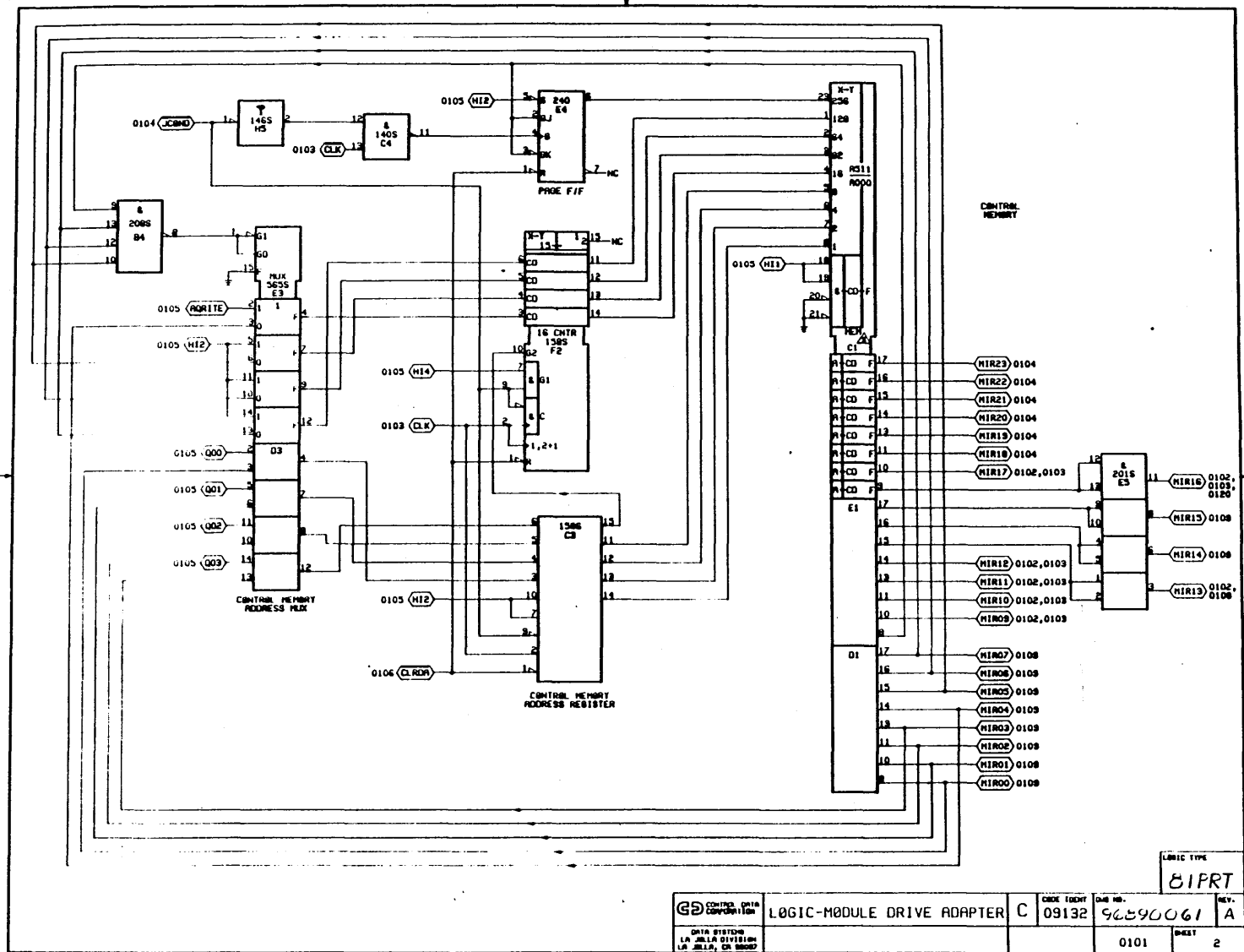
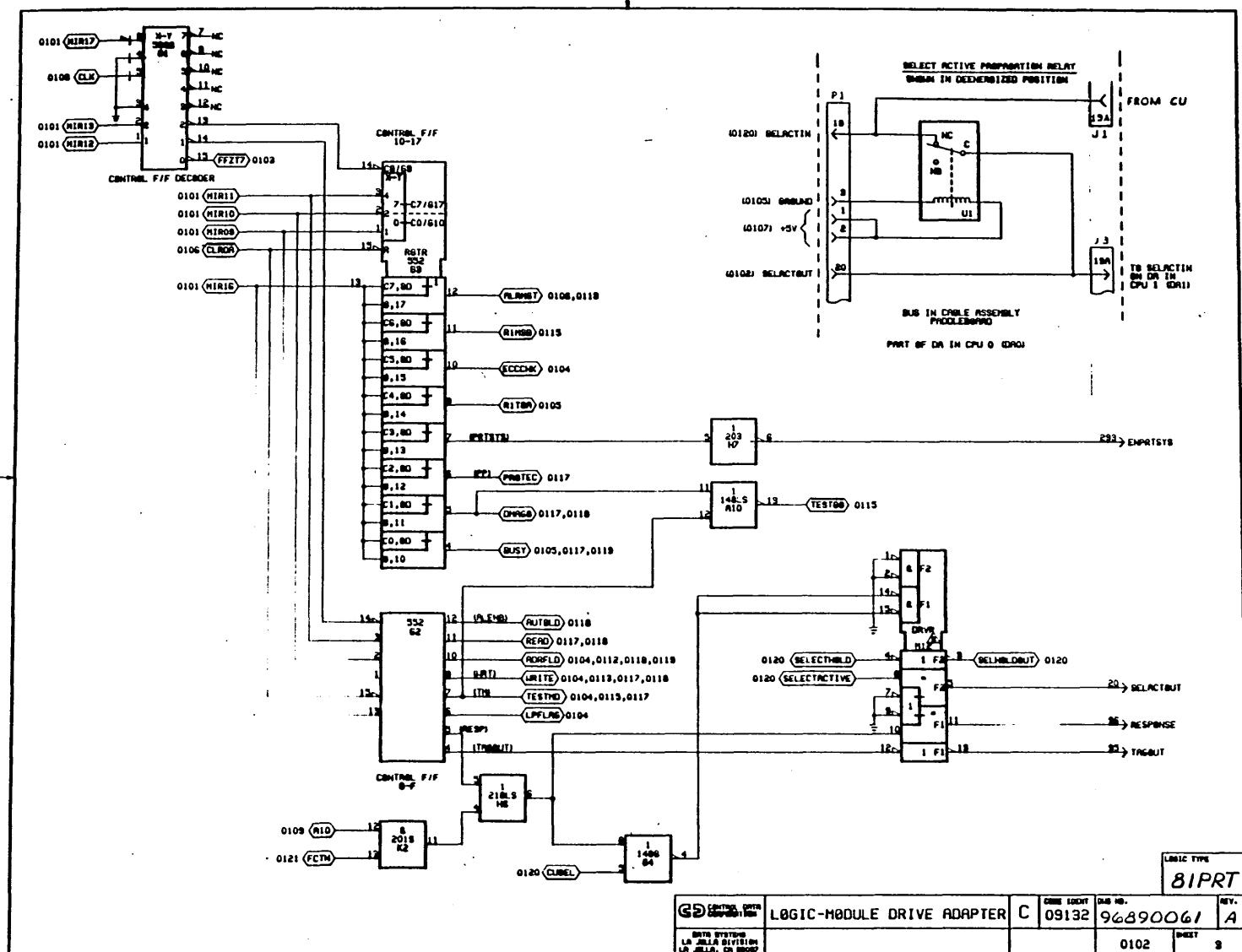


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 2 of 22)



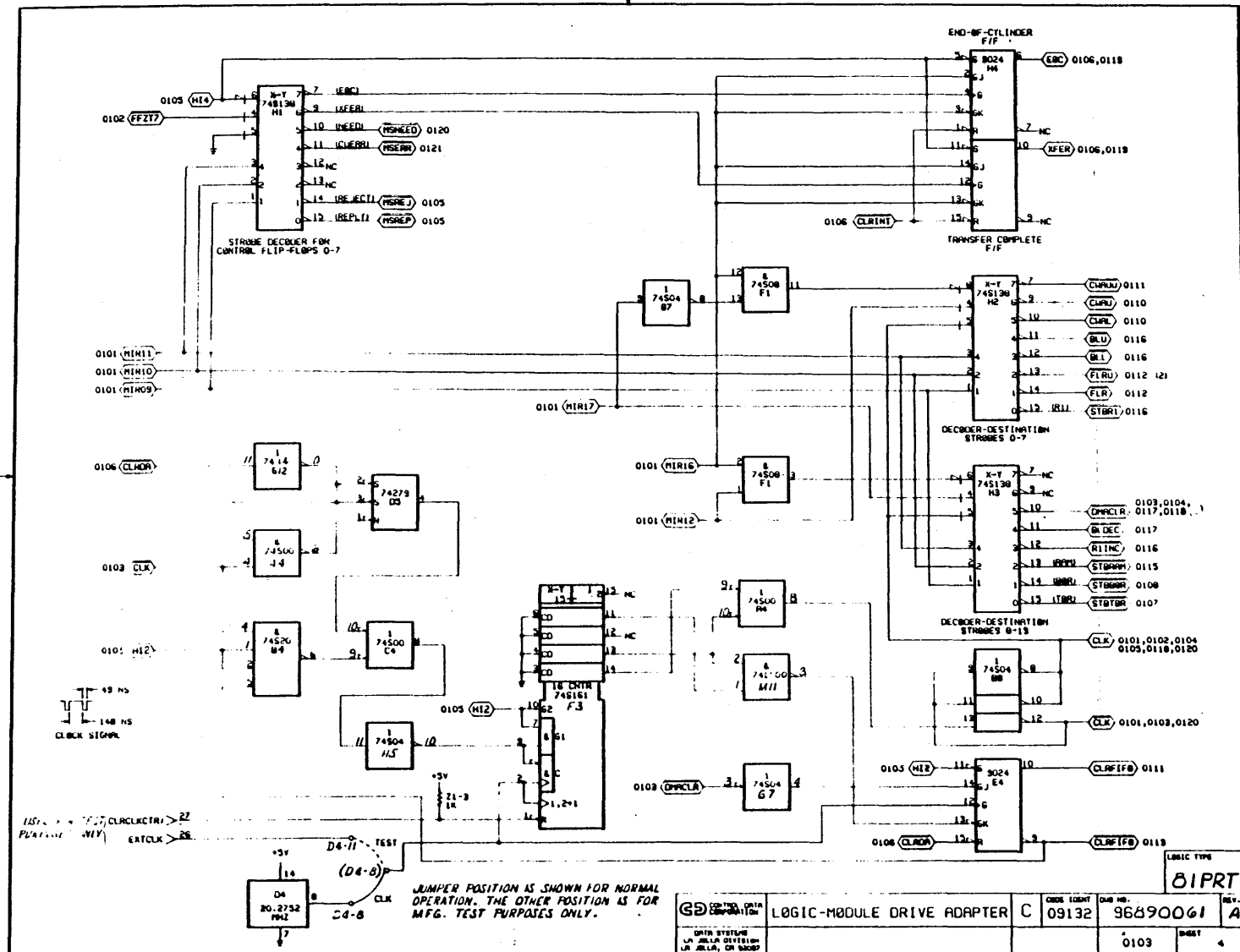


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 4 of 22)

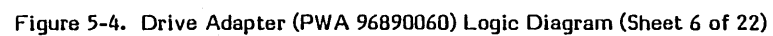


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 6 of 22)

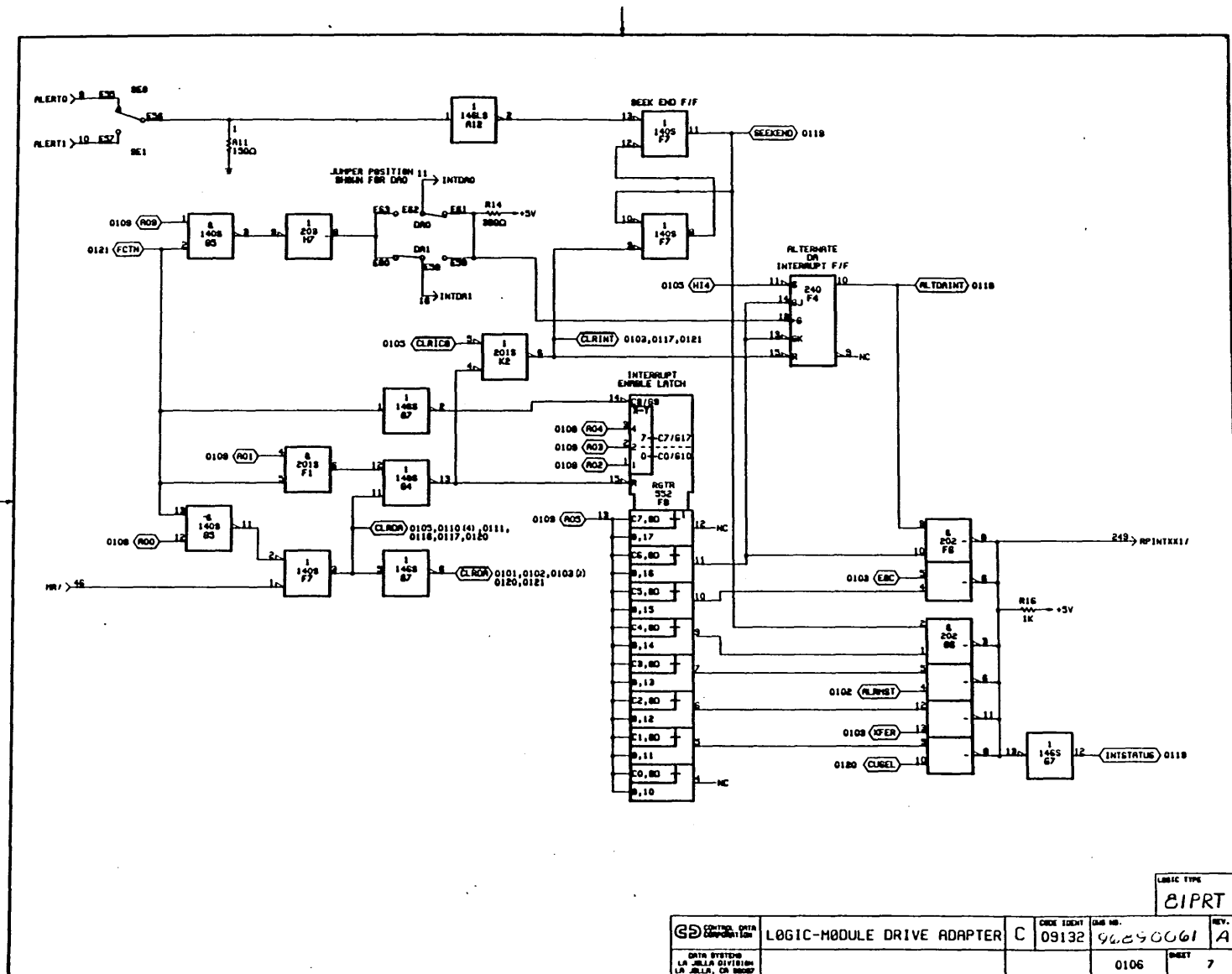
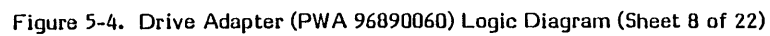


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 7 of 22)



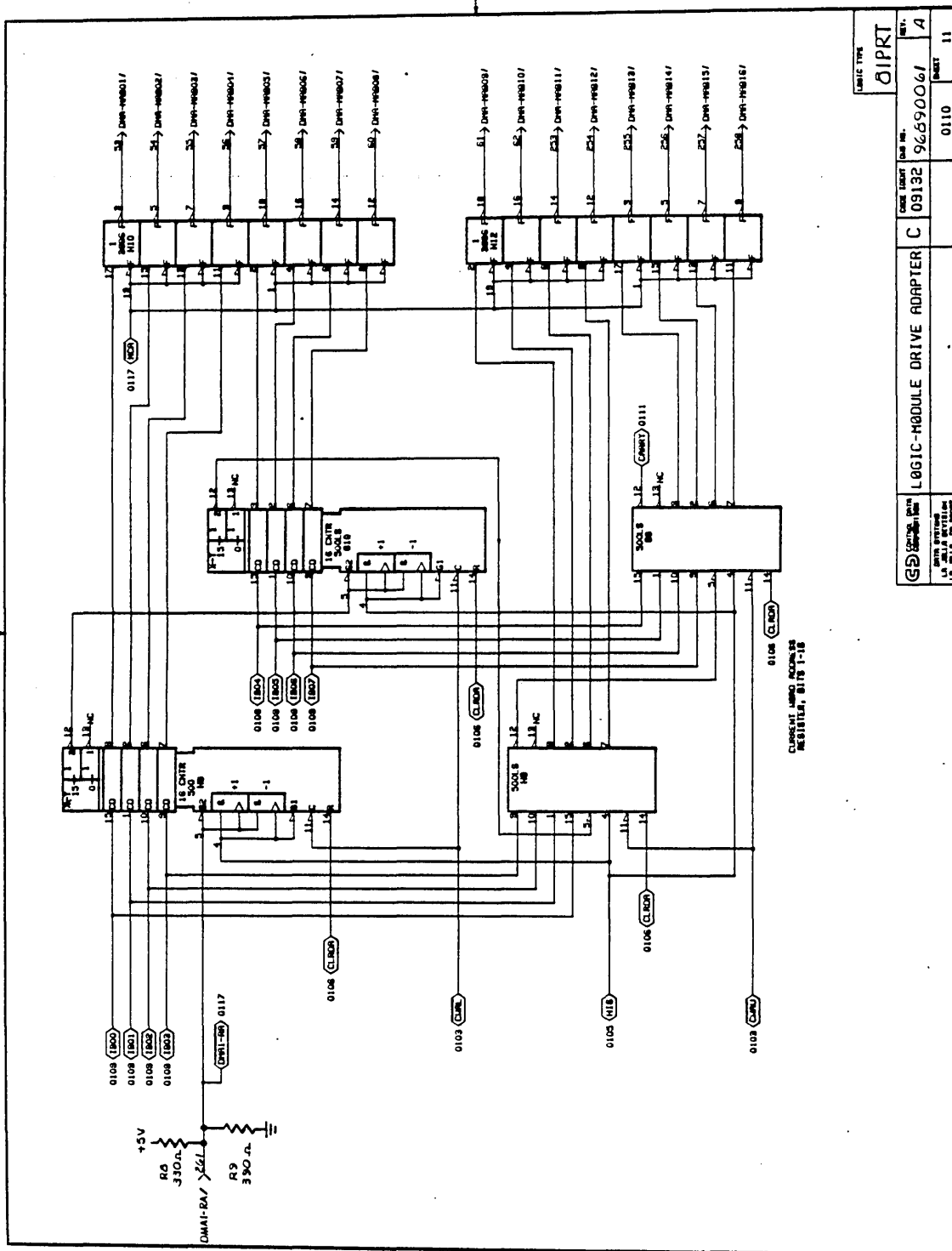
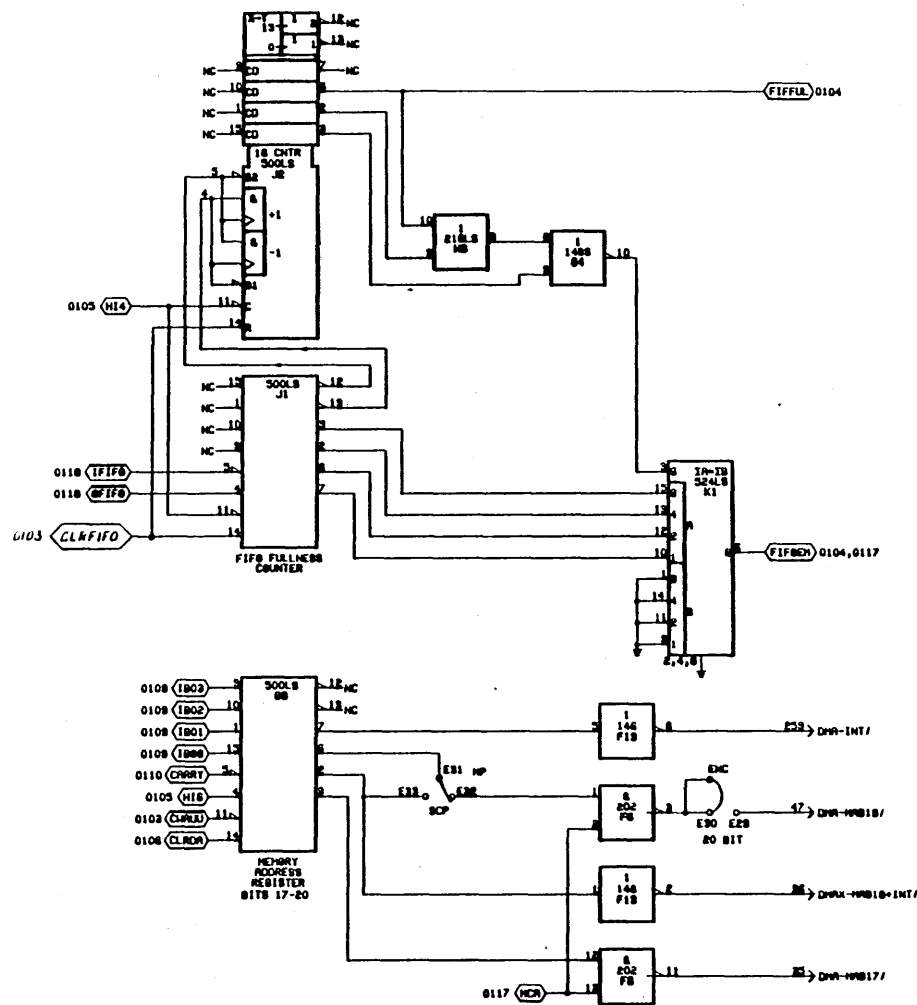


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 11 of 22)



LOGIC TYPE		81PRT	
CD	CONTROL DATA	LOGIC-MODULE DRIVE ADAPTER	C
DATA SYSTEM	LA JOLLA DIVISION	LA JOLLA, CA 92037	
CASE IDENT	09132	DWG NO.	96890061
REV.	A	0111	SHEET 12

Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 12 of 22)

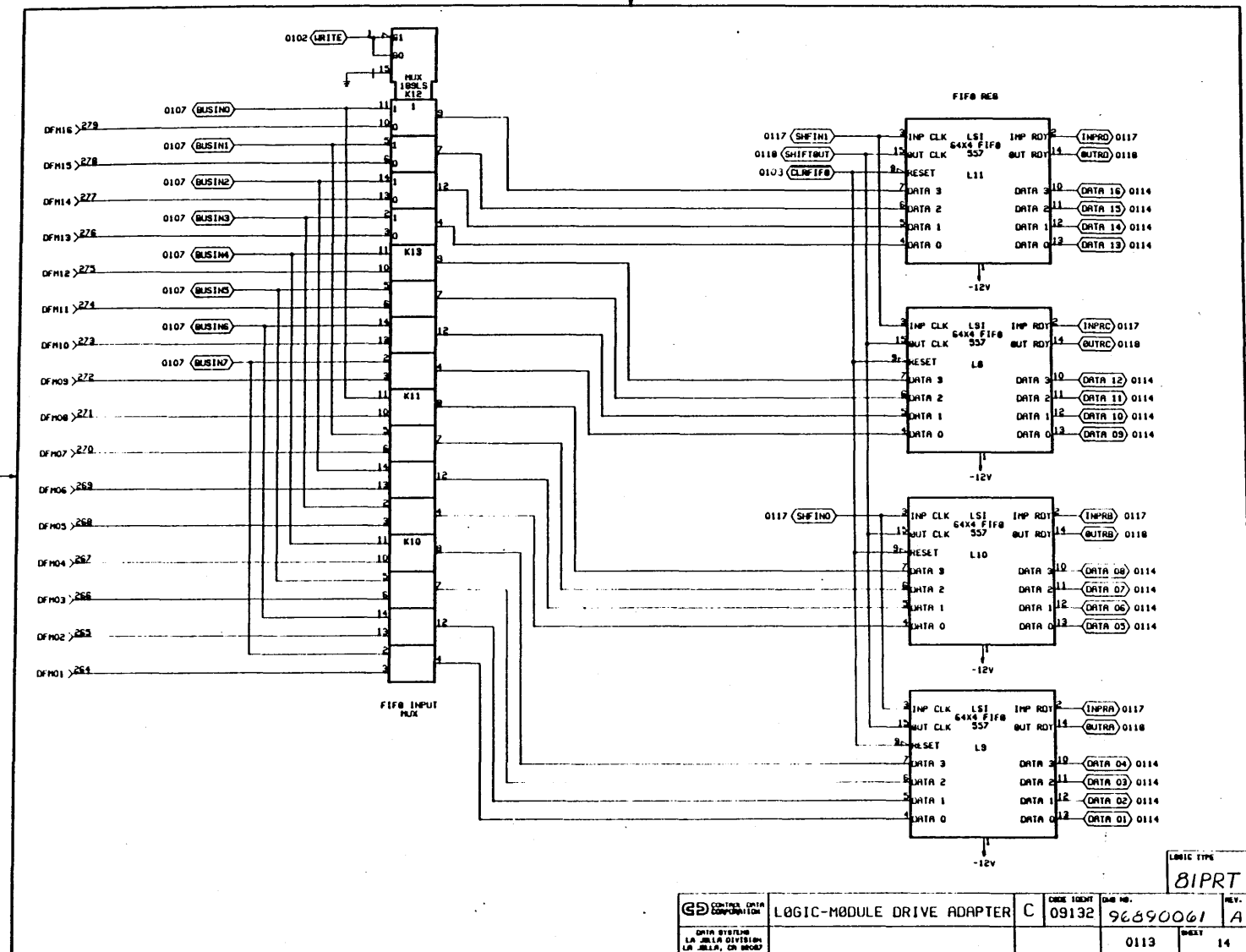
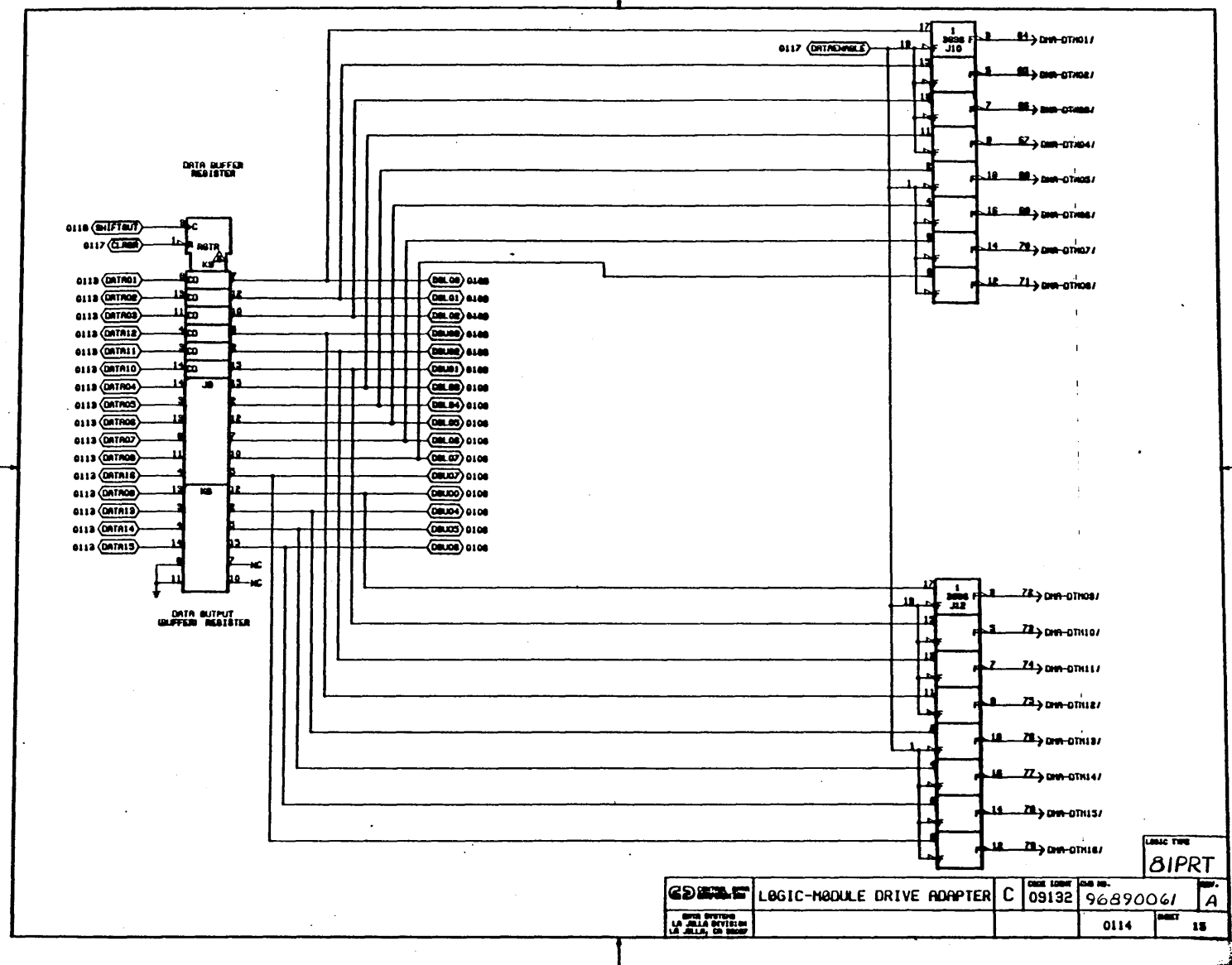
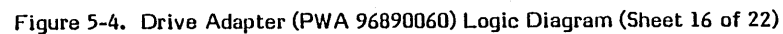
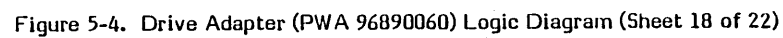


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 14 of 22)







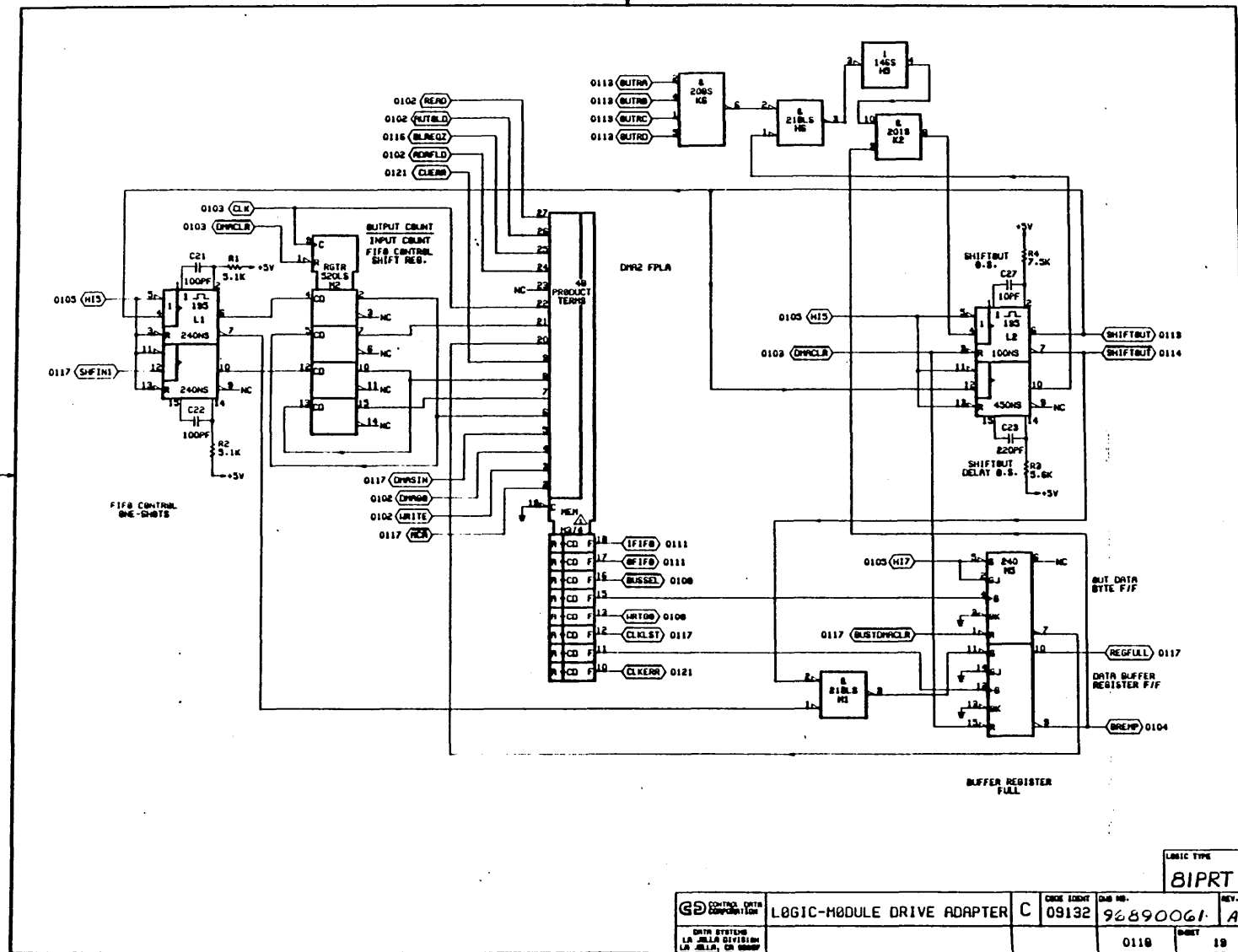


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 19 of 22)

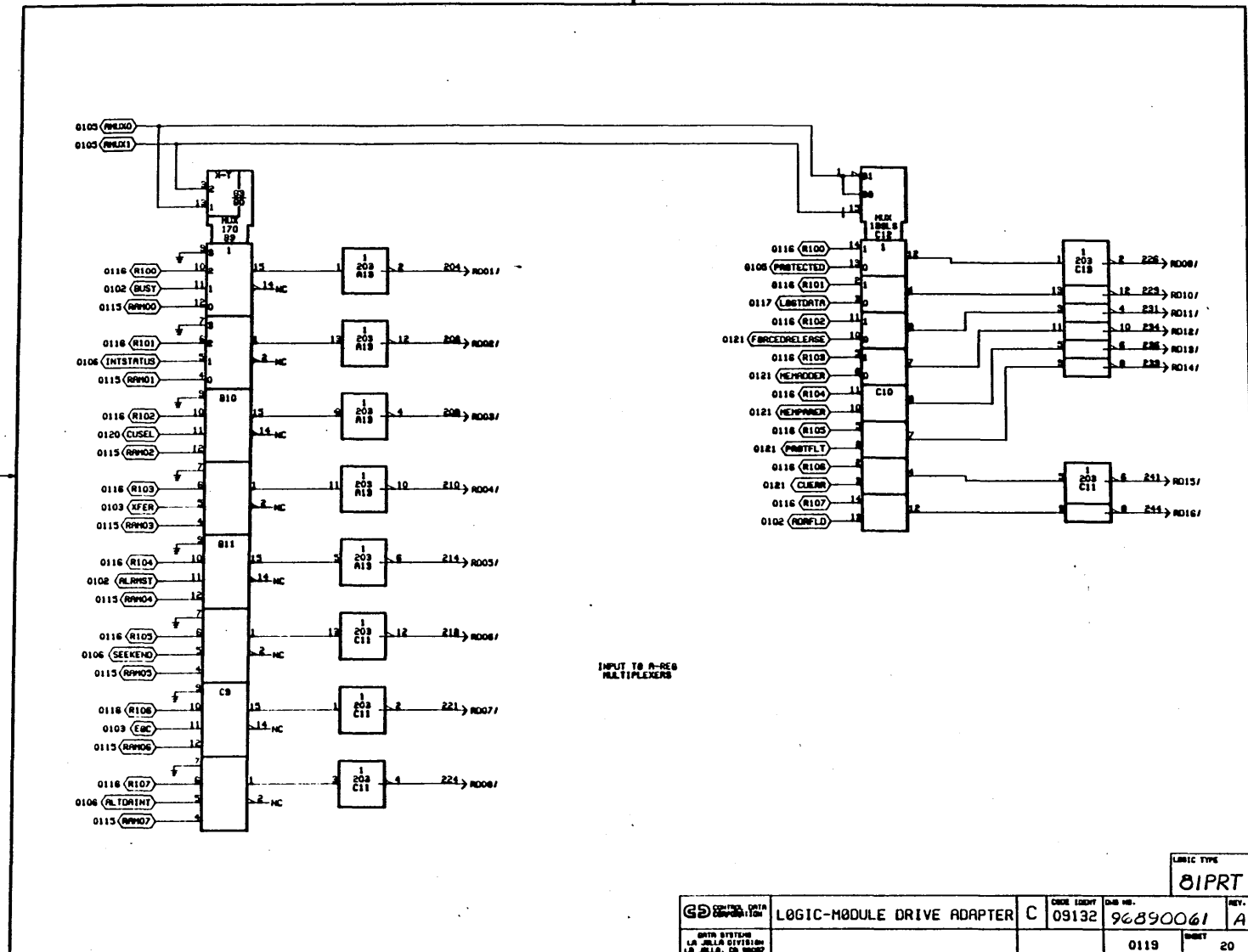
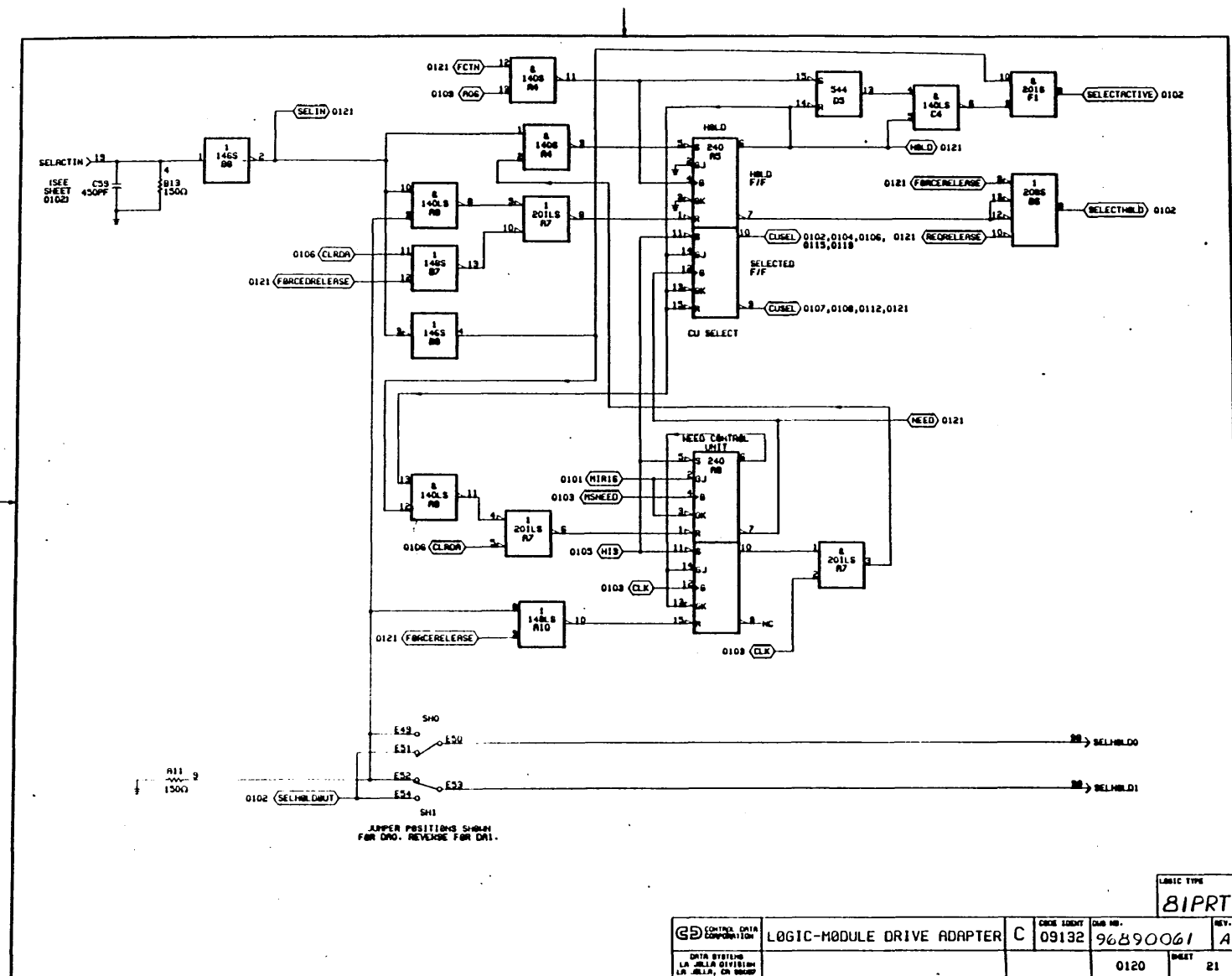


Figure 5-4. Drive Adapter (PWA 96890060) Logic Diagram (Sheet 20 of 22)



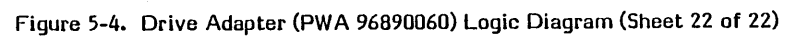


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 1 of 23)

SIGNAL	PIN	DRIVE REF. NO.	SIGNAL	PIN	DRIVE REF. NO.	SIGNAL	PIN	DRIVE REF. NO.	SIGNAL	PIN	DRIVE REF. NO.
RDR01/	280	0105	DMA-DTM12/	75	0114	RD11/	231	0119			
RDR02/	247	0105	DMA-DTM13/	76	0114	RD12/	234	0119			
RDR03/	246	0105	DMA-DTM14/	77	0114	RD13/	236	0119			
RDR04/	245	0105	DMA-DTM15/	78	0114	RD14/	239	0119			
RDR08/	281	0105	DMA-DTM16/	79	0114	RD15/	241	0119			
RDR09/	282	0105	DMA-MAB20/	259	0111	RD16/	244	0119			
RDR10/	283	0105	DMA-MAB01/	53	0110	READ-SSTB/	248	0105			
RDR11/	284	0105	DMA-MAB02/	154	0110	RECYCLE	88	0112			
			DMA-MAB03/	55	0110	REJECT/	220	0105			
ALERT0	9	0106	DMA-MAB04/	56	0110	REPLY/	216	0105			
ALERT1	10	0106	DMA-MAB05/	57	0110	RESPONSE	96	0102			
			DMA-MAB06/	58	0110	RPINTXX1/	249	0106			
BUSIN0	13	0107	DMA-MAB07/	59	0110						
BUSIN1	14	0107	DMA-MAB08/	60	0110	SD01/	203	0109			
BUSIN2	12	0107	DMA-MAB09/	61	0110	SD02/	205	0109			
BUSIN3	15	0107	DMA-MAB10/	62	0110	SD03/	207	0109			
BUSIN4	23	0107	DMA-MAB11/	253	0110	SD04/	209	0109			
BUSIN5	22	0107	DMA-MAB12/	254	0110	SD05/	211	0109			
BUSIN6	17	0107	DMA-MAB13/	255	0110	SD06/	215	0109			
BUSIN7	18	0107	DMA-MAB14/	256	0110	SD07/	219	0109			
BUSPARIN	21	0107	DMA-MAB15/	257	0110	SD08/	223	0109			
			DMA-MAB16/	258	0110	SD09/	225	0109			
BUSOUT0	297	0108	DMA-MAB17/	35	0111	SD10/	228	0109			
BUSOUT1	298	0108	DMA-MAB19/	47	0111	SD11/	230	0109			
BUSOUT2	296	0108	DMA-MAB/	263	0117	SD12/	233	0109			
BUSOUT3	299	0108	DMA-MDS/	262	0117	SD13/	235	0109			
BUSOUT4	91	0108	DMA-MPE/	252	0121	SD14/	238	0109			
BUSOUT5	94	0108	DMA-PFLT1/	237	0121	SD15/	240	0109			
BUSOUT6	92	0108	DMA-PR0T/	232	0117	SD16/	243	0109			
BUSOUT7	93	0108	DMA1-RA/	261	0110						
BUSOUTPAR	87	0112	DMA-WRITE/	63	0117	SECTOR	8	0121			
			DMAX-MAB18/	36	0111						
CHECKEND	5	0121	DMAX-MR/	260	0117	SELECTIN	19	0120			
CLCLKCTR/	27	0103	DMA-MAB18/	47	0111						
DFM01	264	0113	ENPRTSYS	293	0102						
DFM02	265	0113	EXTCLK	26	0103	SELH0LD0	98	0120			
DFM03	266	0113	GND	3	0107	SELH0LD1	99	0120			
DFM04	267	0113	GND	25	0107						
DFM05	268	0113	GND	81	0107	SWGND	43	0104			
DFM06	269	0113	GND	101	0107	SWNC	45	0104			
DFM07	270	0113	GND	102	0107	SWN0	42	0104			
DFM08	271	0113	GND	301	0107						
DFM09	272	0113	GND	302	0107	SYNCRIN	24	0117			
DFM10	273	0113				SYNCRUT	90	0112			
DFM11	274	0113	INDEX	6	0121						
DFM12	275	0113	INT0R0	11		TAGBUS0	86	0107			
DFM13	276	0113	INT0R1	16	0106	TAGBUS1	85	0107			
DFM14	277	0113				TAGBUS2	84	0107			
DFM15	278	0113	MR/	46	0106	TAGBUS3	83	0107			
DFM16	279	0113	N0RMALEND	7	0121	TAGBUSPAR	89	0112			
			PR06-PR0T	291	0105	TAGOUT	95	0102			
DMA-DTM01/	64	0114				TAGVALID	4	0104			
DMA-DTM02/	65	0114	RD01/	204	0119						
DMA-DTM03/	66	0114	RD02/	206	0119	WEB	292	0105			
DMA-DTM04/	67	0114	RD03/	208	0119	WRITE/	290	0105			
DMA-DTM05/	68	0114	RD04/	210	0119						
DMA-DTM06/	69	0114	RD05/	214	0119	+5VDC	1	0107			
DMA-DTM07/	70	0114	RD06/	218	0119	+5VDC	2	0107			
DMA-DTM08/	71	0114	RD07/	221	0119	+5VDC	201	0107			
DMA-DTM09/	72	0114	RD08/	224	0119	+5VDC	202	0107			
DMA-DTM10/	73	0114	RD09/	226	0119						
DMA-DTM11/	74	0114	RD10/	229	0119	-12VDC	51	0107			

REVISION RECORD				
REV	ECO	DESCRIPTION	DATE	APP
A	0510375	CL A RELEASED	4/1/77	9/2/81

NOTES: UNLESS OTHERWISE SPECIFIED

- SPARE GATES

7405 2 AT H7
74S20 1 AT K6
9602 1 AT F3

- SOME CIRCUIT ELEMENTS SHOW VENDOR NUMBER WITHOUT (74) PREFIX.

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.		LOGIC TYPE 5-51
AAL030		

GDS FILED ON 65145-5 CHK DNR PFS APPD	TITLE LOGIC-MODULE DRIVE ADAPTER CODE ENTRY 09132 DNR NO. 96890092
96890030	SHEET 1 OF 23

Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 2 of 23)

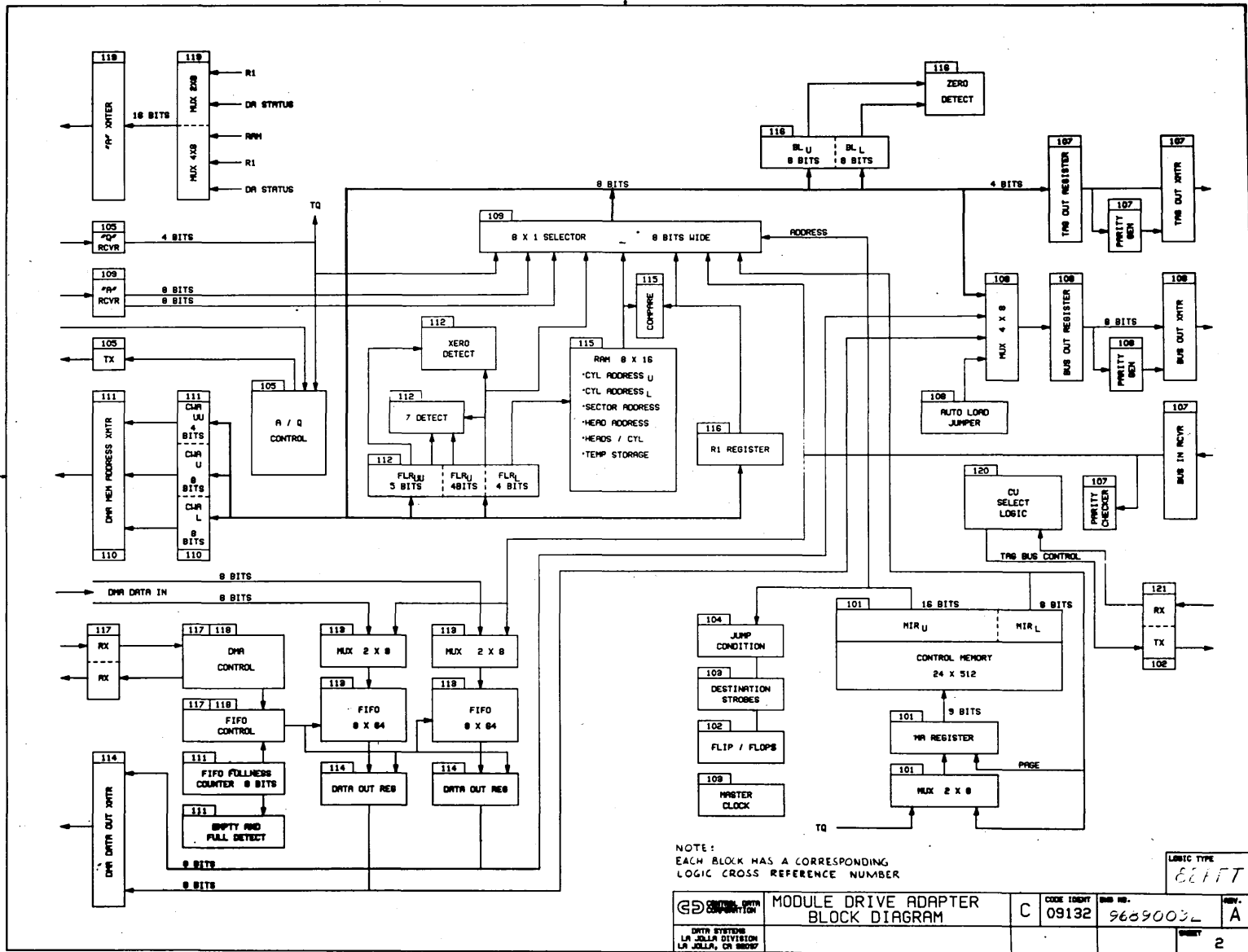
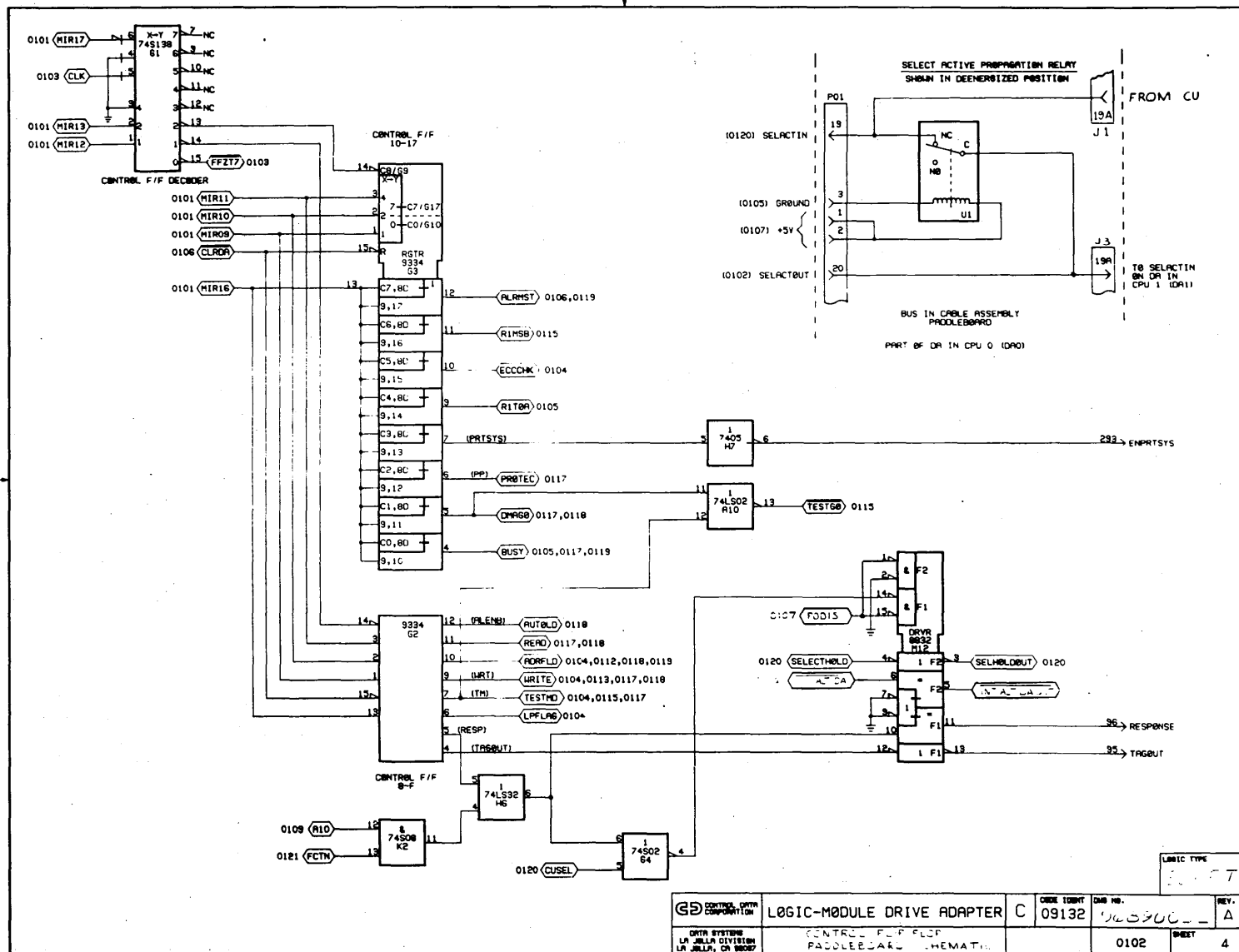


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 4 of 23)



LOGIC TYPE		REV.	
74LS138		A	
74LS02		A	
74LS04		A	
74LS32		A	
9334		A	
74LS08		A	
74LS00		A	
74LS01		A	
74LS03		A	
74LS05		A	
74LS06		A	
74LS07		A	
74LS09		A	
74LS10		A	
74LS11		A	
74LS12		A	
74LS13		A	
74LS14		A	
74LS15		A	
74LS16		A	
74LS17		A	
74LS18		A	
74LS19		A	
74LS20		A	
74LS21		A	
74LS22		A	
74LS23		A	
74LS24		A	
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74LS61		A	
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74LS65		A	
74LS66		A	
74LS67		A	
74LS68		A	
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74LS70		A	
74LS71		A	
74LS72		A	
74LS73		A	
74LS74		A	
74LS75		A	
74LS76		A	
74LS77		A	
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74LS79		A	
74LS80		A	
74LS81		A	
74LS82		A	
74LS83		A	
74LS84		A	
74LS85		A	
74LS86		A	
74LS87		A	
74LS88		A	
74LS89		A	
74LS90		A	
74LS91		A	
74LS92		A	
74LS93		A	
74LS94		A	
74LS95		A	
74LS96		A	
74LS97		A	
74LS98		A	
74LS99		A	
74LS100		A	

The schematic diagram illustrates the internal logic of the Logic-Module Drive Adapter (LA). Key components and connections include:

- Inputs:** TAGVAL10, SUMC, SUMB, SUMD, and a +5V supply.
- Logic Components:**
 - 74150 R1:** A 16-to-1 multiplexer that selects between various input signals based on control lines (0101, 0102, 0103, 0104, 0105, 0106, 0107, 0108, 0109, 0110, 0111, 0112, 0113, 0114, 0115, 0116, 0117, 0118, 0119, 0120, 0121, 0122, 0123).
 - 74273 DS:** A D-type flip-flop used for data storage and timing.
 - 74502 ST:** A 2-to-1 multiplexer used for signal selection.
 - 74500 C4:** A 4-to-1 multiplexer used for signal selection.
 - 7496 K7:** A 4-to-1 multiplexer used for signal selection.
- Internal Signals:** A series of internal signals (0101 through 0123) that route data between the multiplexers and the flip-flop.
- Outputs:** JUMP, JUMP CONDITION, and JUMP CONDITION MUX.

The diagram shows a complex interconnection of these components, with the 74150 R1 acting as the central routing element. The 74273 DS and 74502 ST provide timing and signal selection, while the 74500 C4 and 7496 K7 further process the signals before outputting the final JUMP and JUMP CONDITION signals.

Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 7 of 23)

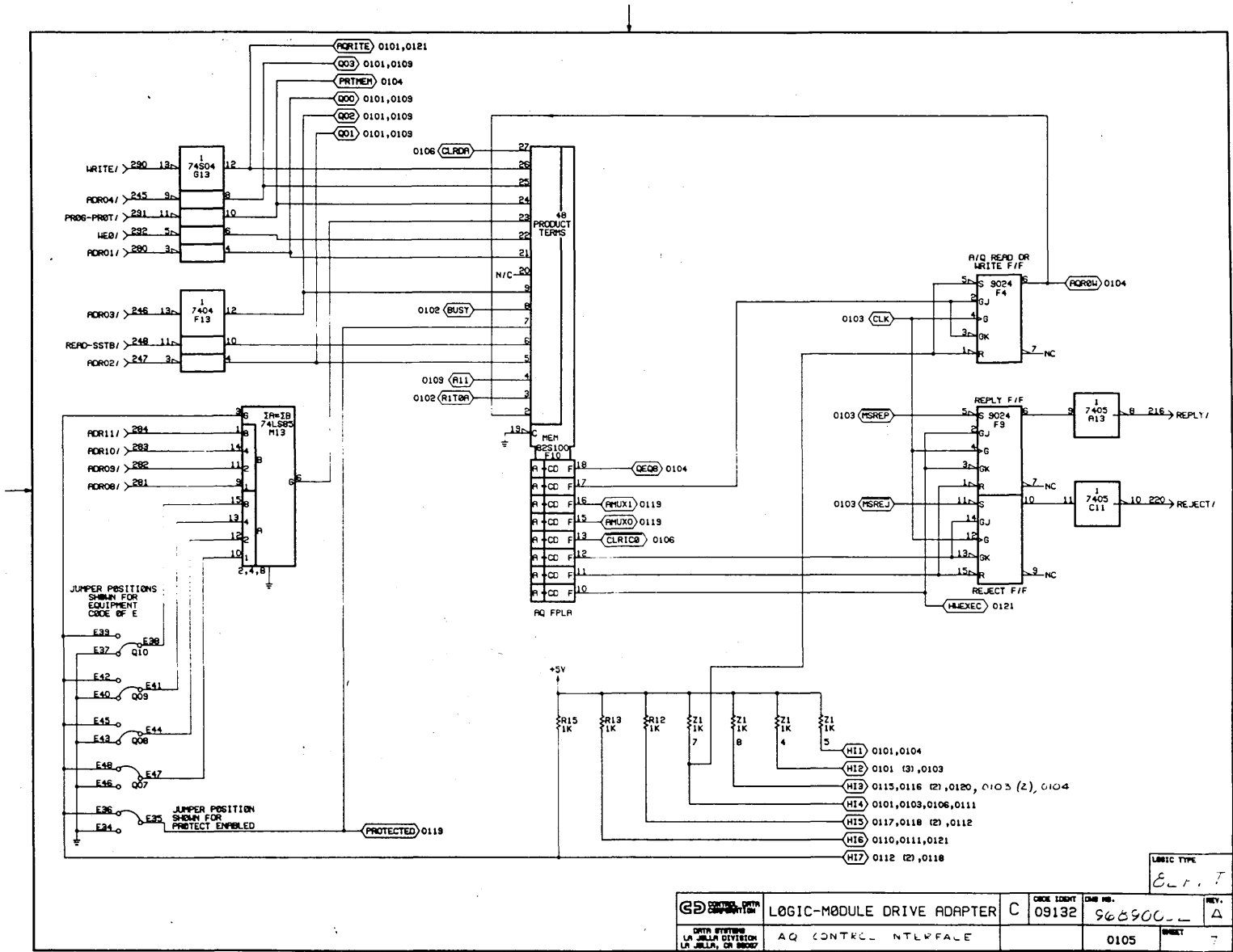


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 9 of 23)

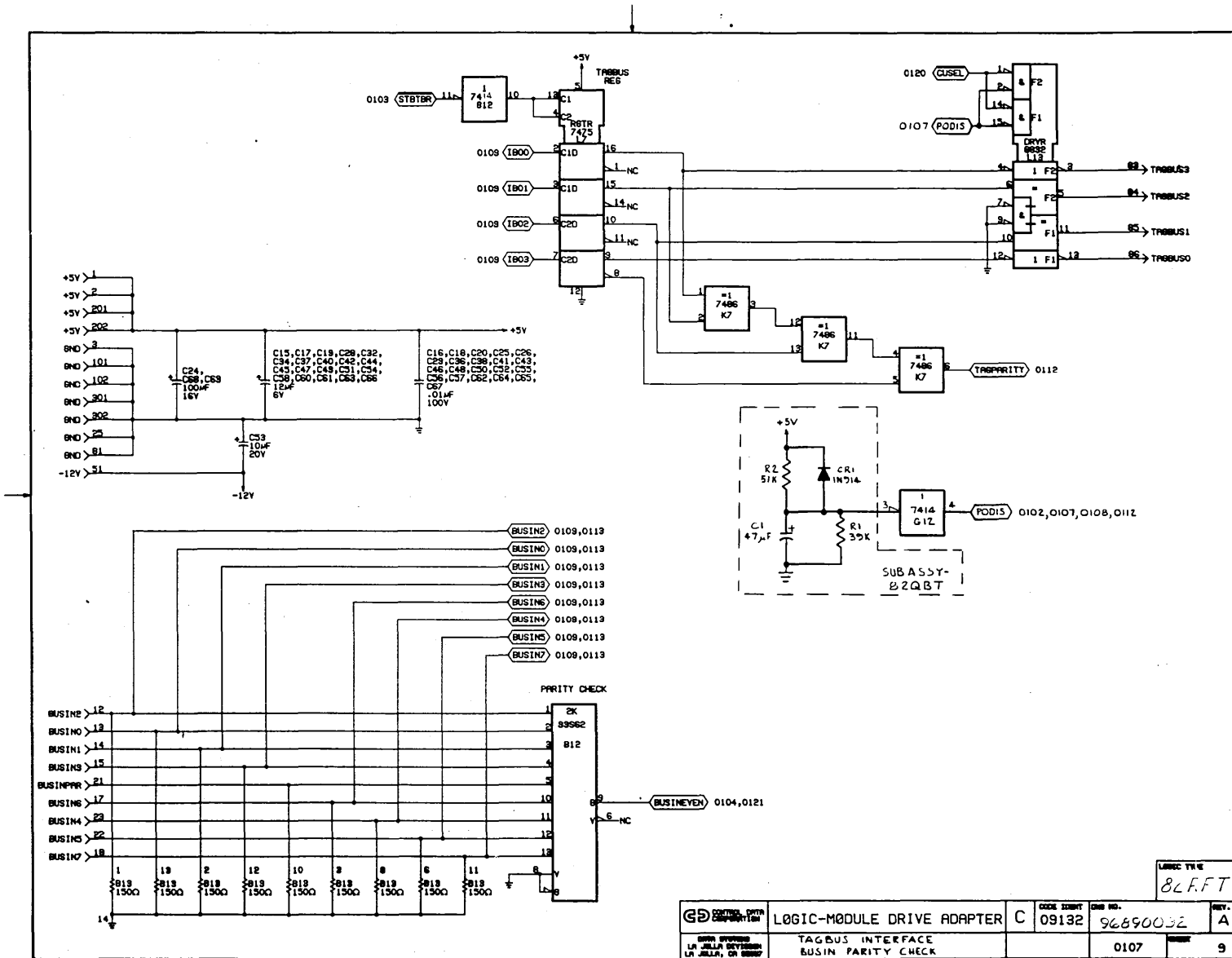
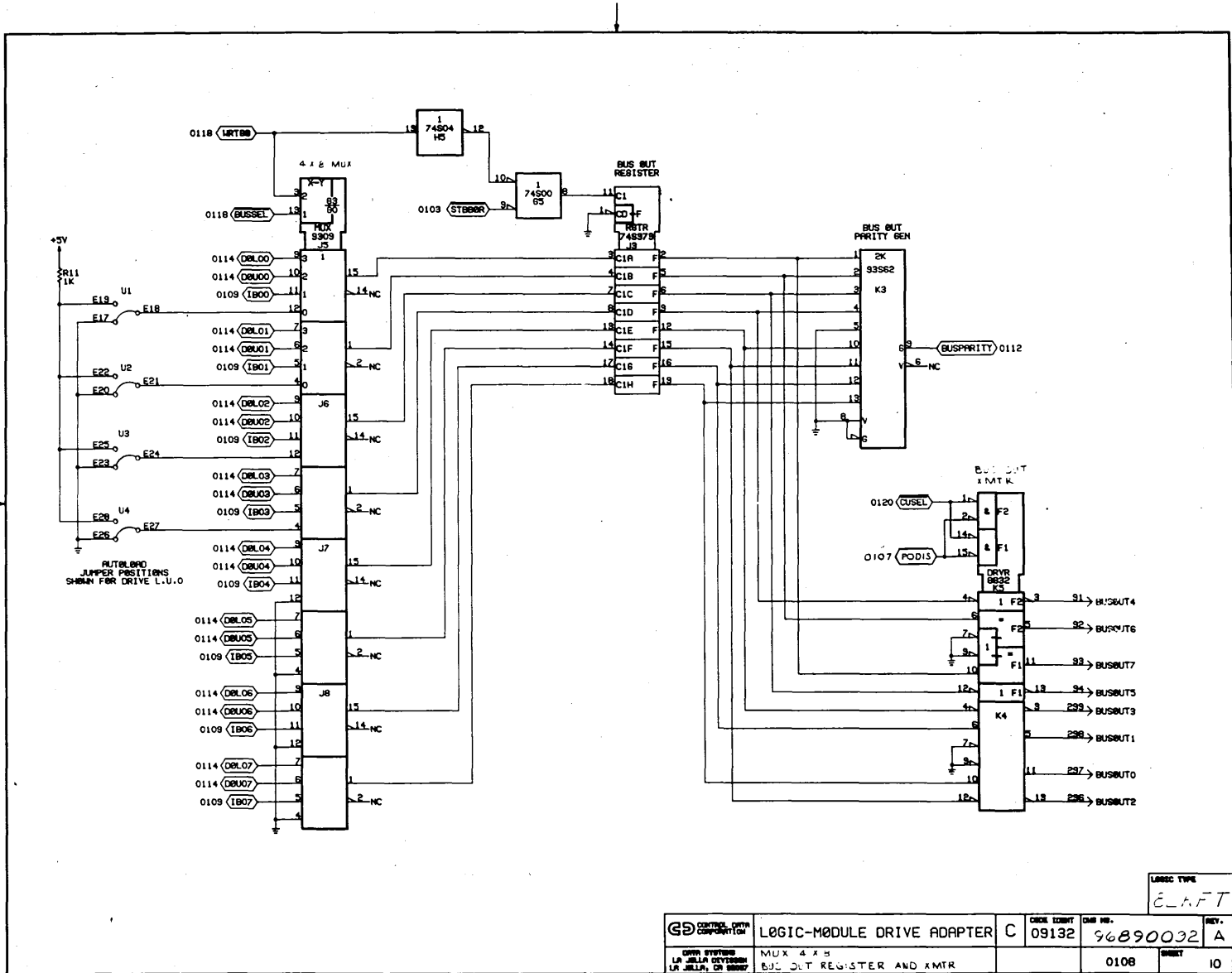


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 10 of 23)



[illegible]

Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 13 of 23)

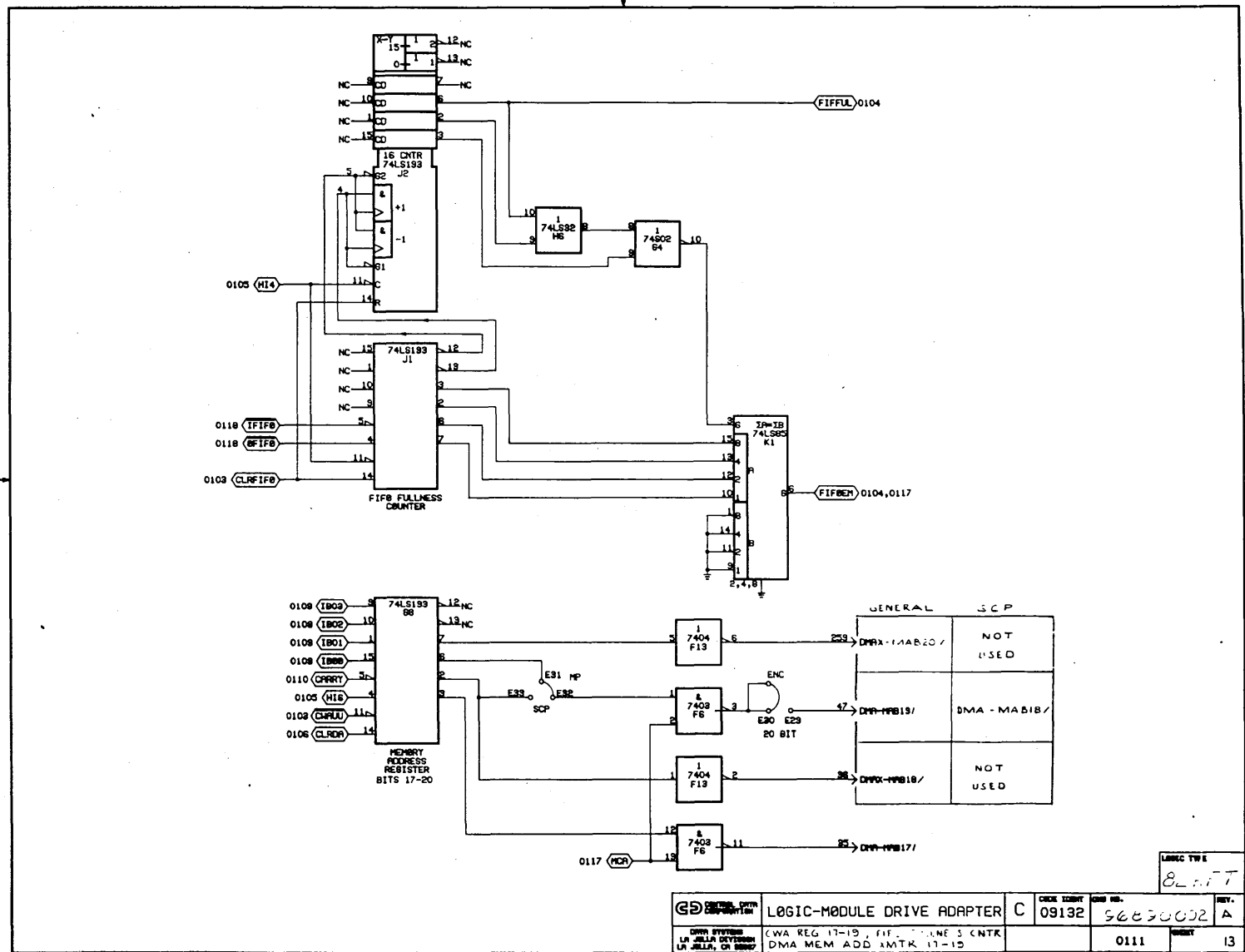


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 15 of 23)

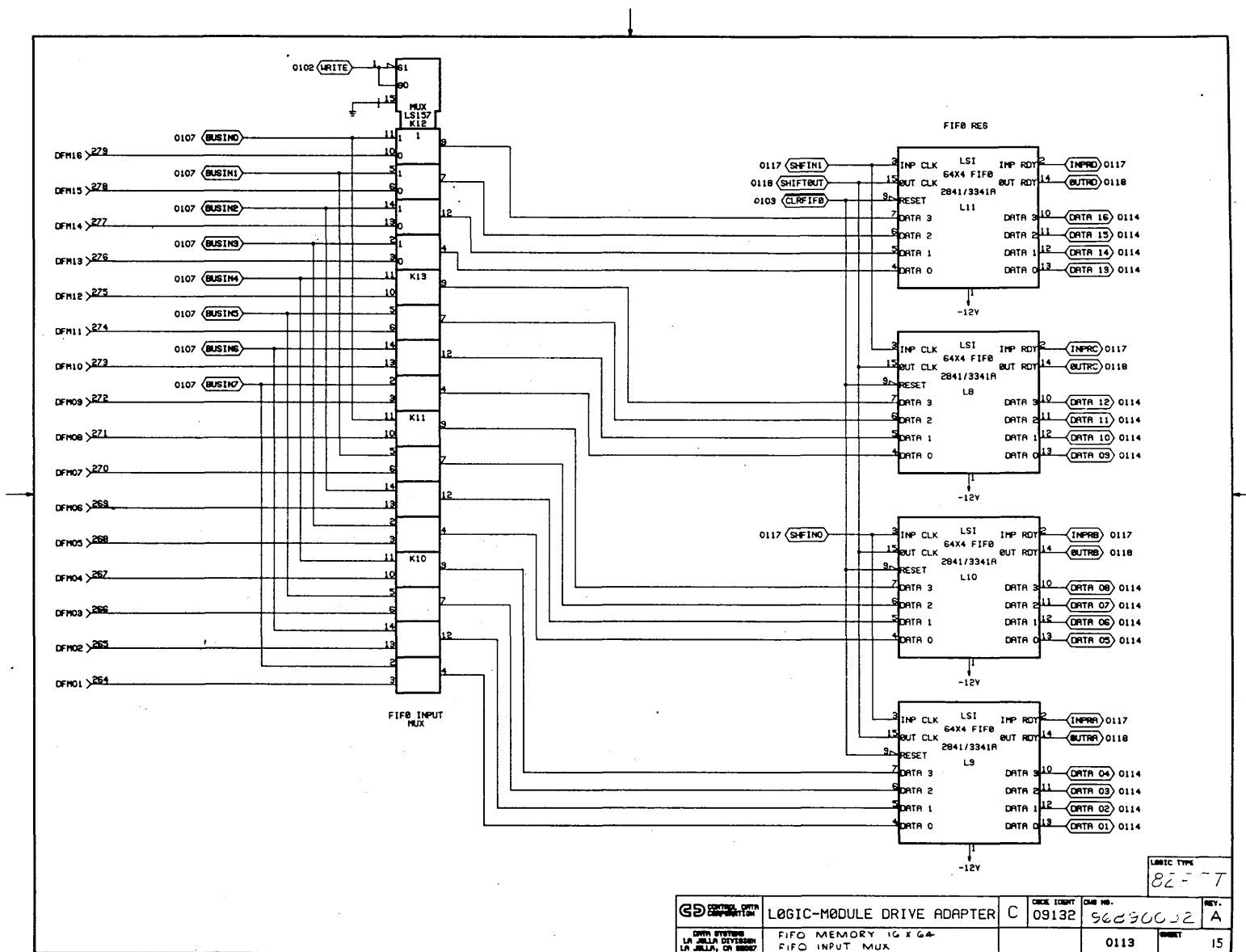


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 16 of 23)

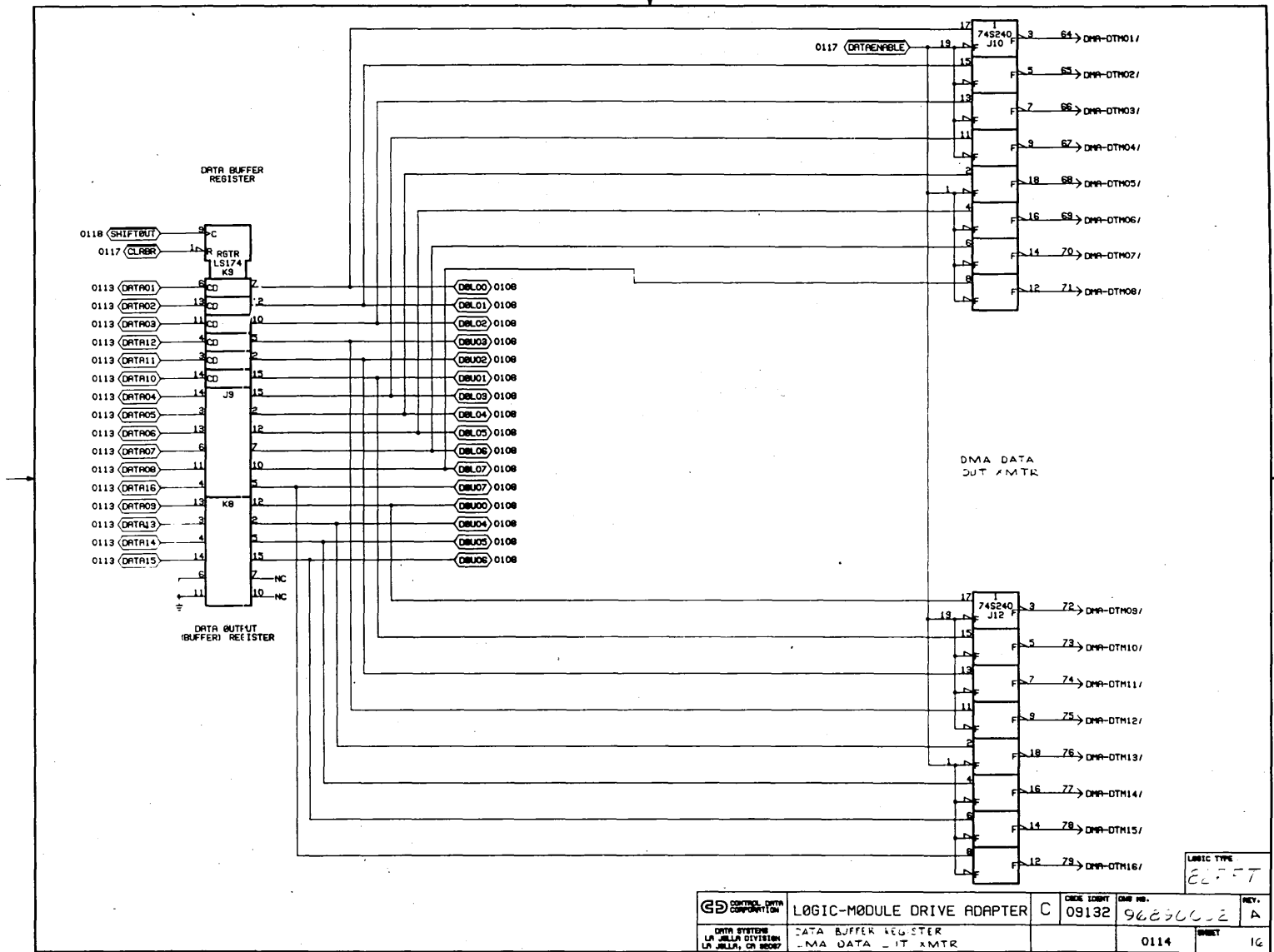


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 18 of 23)

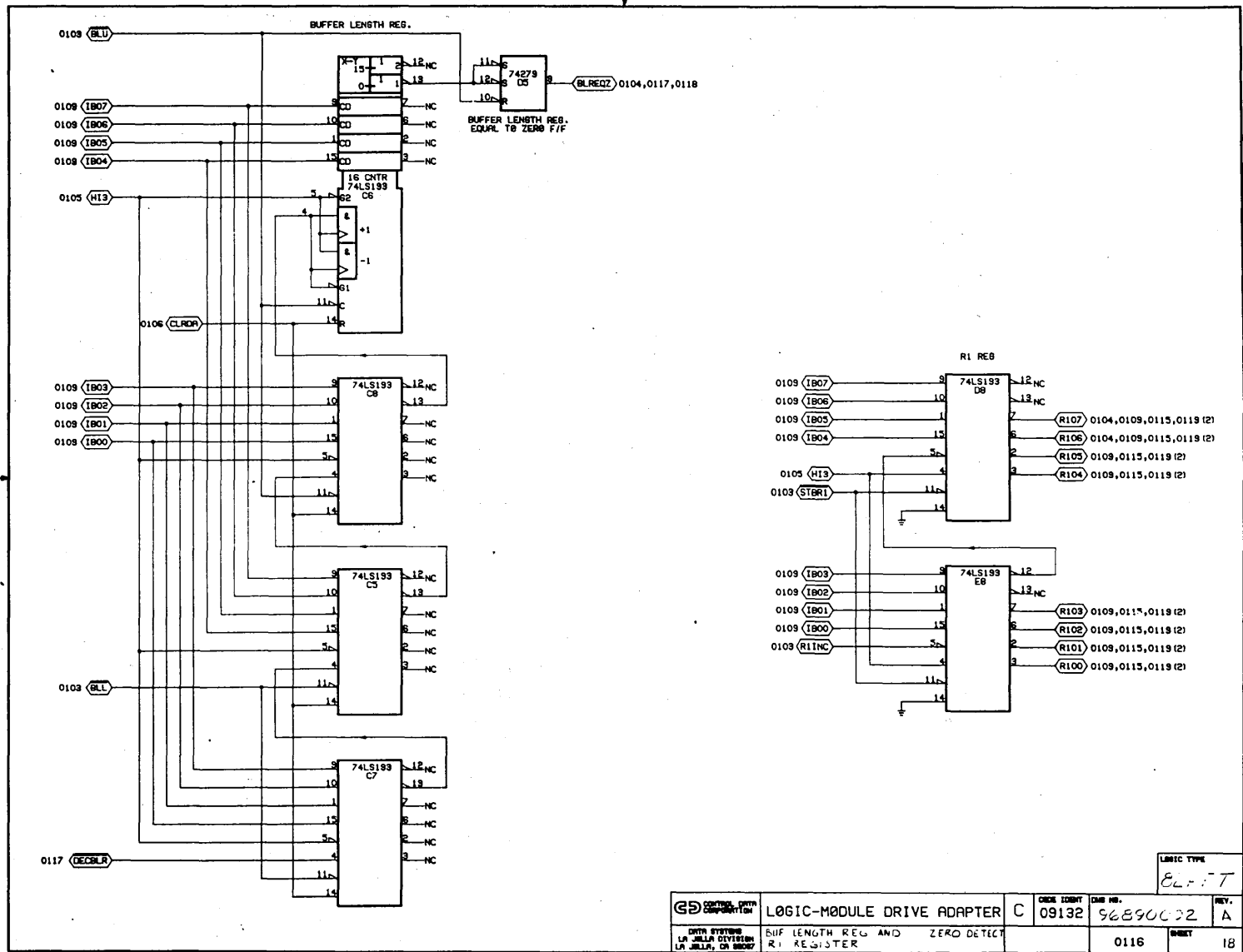
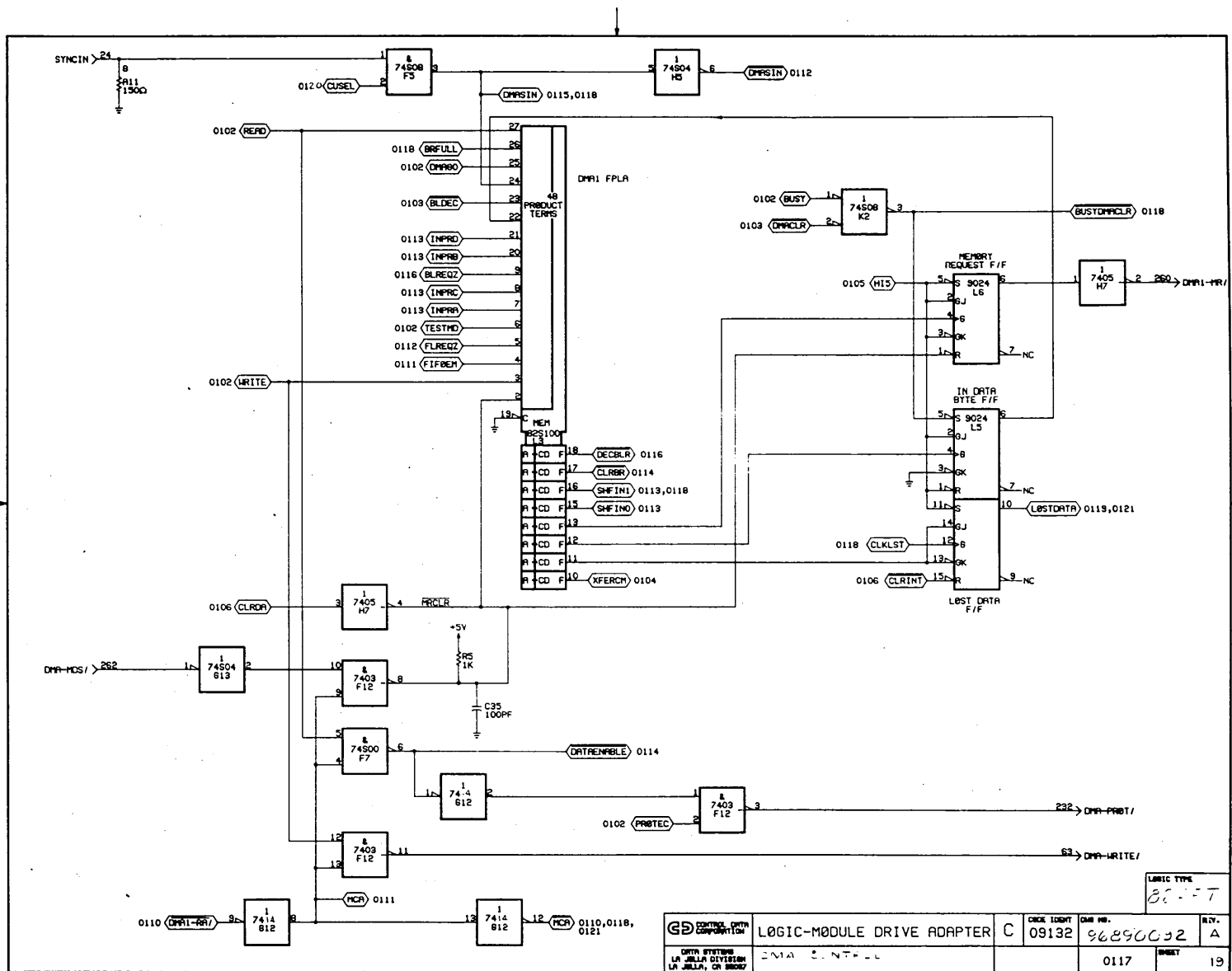


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 19 of 23)



COMPONENT	LOGIC-MODULE DRIVE ADAPTER	C	ORIGIN	DATE	REV.
DATA SYSTEMS	LMA CONTROL		09132	9/83	4
LA JOLLA DIVISION					
LA JOLLA, CA 92037					

Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 21 of 23)

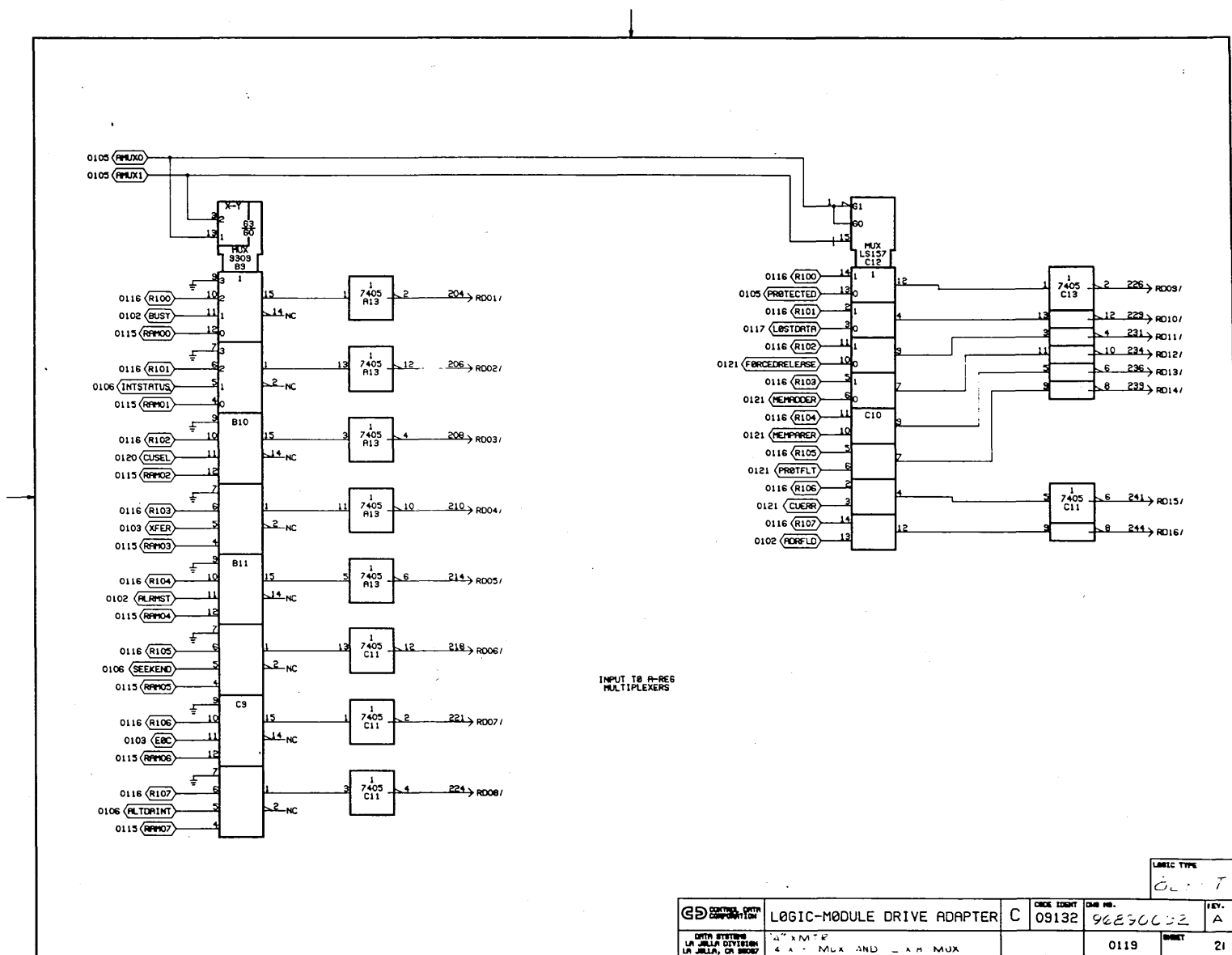


Figure 5-5. Drive Adapter (PWA 96890090) Logic Diagram (Sheet 23 of 23)

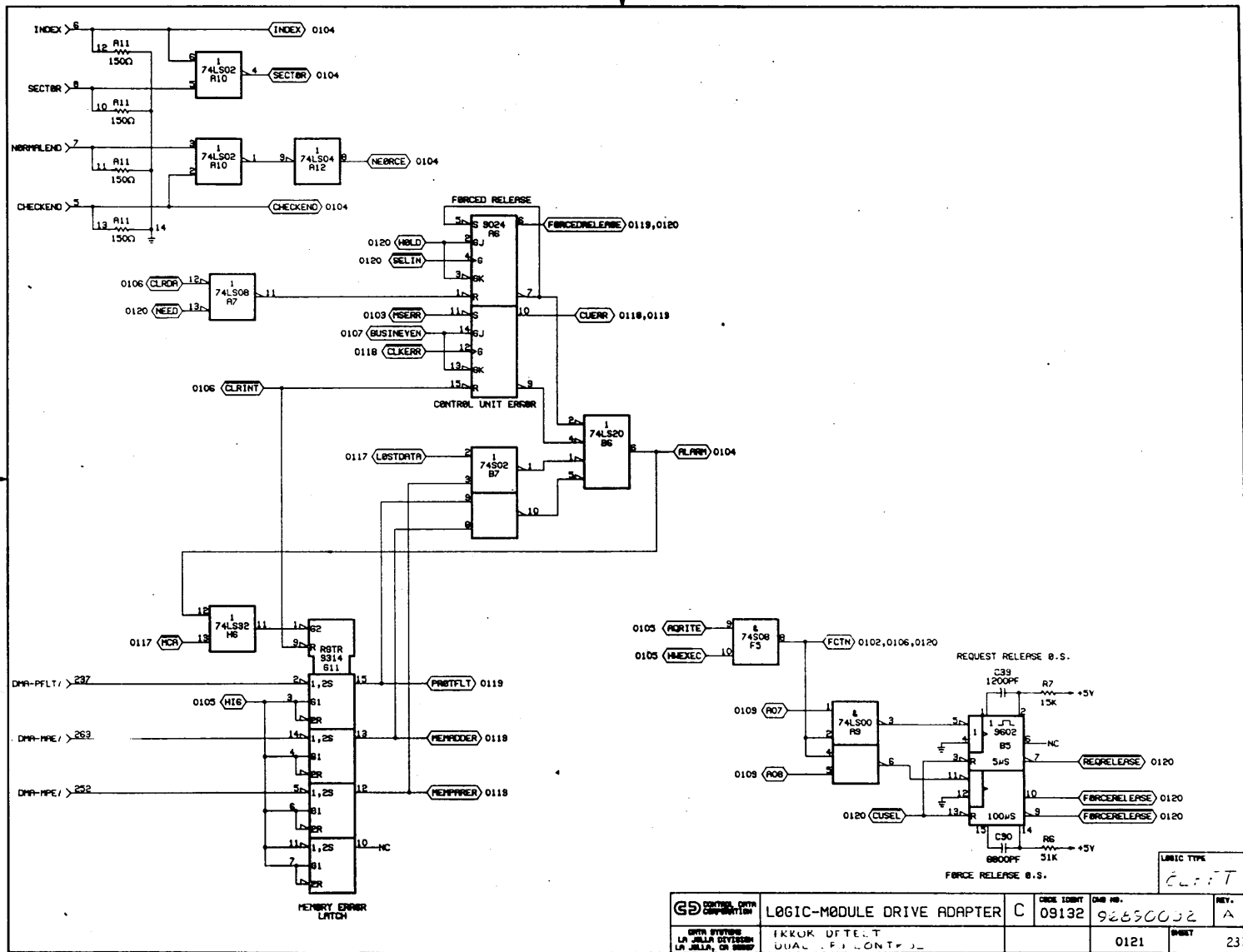
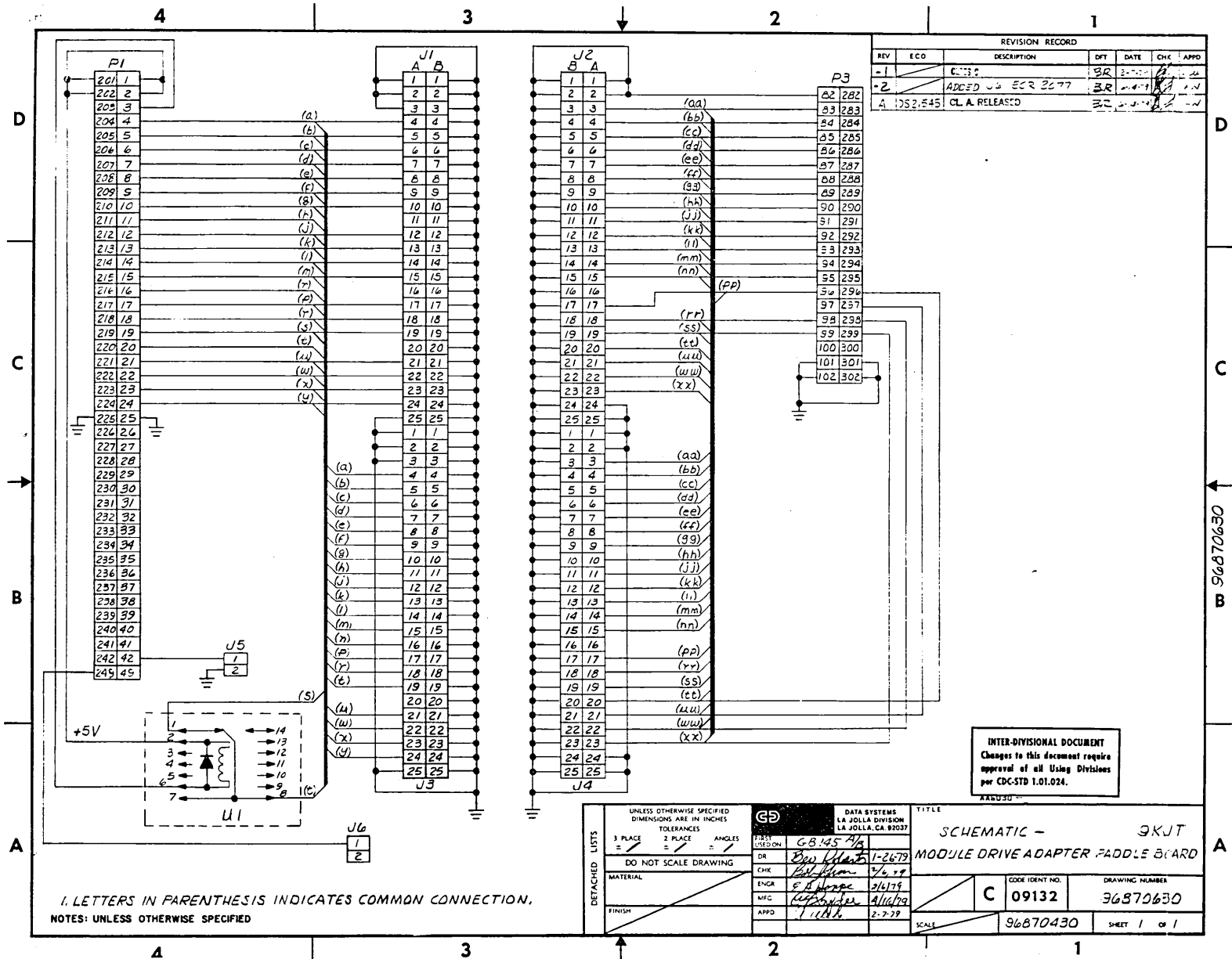


Figure 5-6. Module Drive Adapter Paddle Board



This section contains minor maintenance procedures for the drive adapter. Drive adapter maintenance procedures applicable to CYBER 18 Series systems are contained in the module drive subsystem hardware maintenance manual.

PREVENTIVE MAINTENANCE

The drive adapter consists of a PWA that plugs into the CPU chassis and a backplane adapter paddle board that fits over the CPU backplane pins. Preventive maintenance for the drive adapter is detailed by the preventive maintenance procedures in the processor hardware maintenance manual. The cleaning of dirt and dust from all PWAs while performing preventive maintenance is emphasized.

CALIBRATION AND ALIGNMENT

The drive adapter requires no field calibration or alignment.

TROUBLESHOOTING

Troubleshooting to the PWA level is accomplished using the following operational diagnostic system (ODS) diagnostics:

SMDDA
SMDCU
SMD01
SMD2A
SMD2F
SMD2M
SMD2N
SMDUT

Refer to the ODS reference manual and module drive subsystem hardware maintenance manual for detailed drive adapter troubleshooting procedures.

This section contains the spare parts lists, assembly drawings, and assembly parts lists for the components that

comprise the drive adapter.

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
01	DS18940	CL. B. PRE-RELEASED	RJ2	11-17-78	JH	AW	
A	DS21545	CL. A. RELEASED	BV	6-14-79	JH	AW	
B	DS21782	CHG TO F/N 1	BV	10-29-79	JH	AW	
C	DS21951	CHG TO F/N 1	B. J.	8-8-80	JH	AW	
D	DS22171	CHG TO F/N 1	J.V.W.	3-31-81	JH	AW	
E	DS22210	ADDED F/N'S 3 & 4	J.V.W.	1-25-83	JH	AW	

OWN	R. J. Rose	6-6-78	 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	TITLE		SPL-GB145-A MODULE DRIVE ADAPTER	
CHKD	T. J. Rose	11-9-78		CODE IDENT	A	DWG No	96752523
ENG	R. J. Rose	11-9-78					
MFG	R. J. Rose	11-17-78					
APP	R. J. Rose	11-9-78	SCALE	96752522			

 CONTROL DATA CORPORATION

ASSEMBLY PARTS LIST

96752523		E	A	A	SPL-GB145-A MODULE DRIVE ADPTR	DSM	GB145A	11/13/78	022210	01/19/83	PR
ASSEMBLY NUMBER	REV	CL	CH	DT	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER
PART NUMBER	QTY	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/INIT	PH	OR
1 A 96720454	1.00	PC PWA-MODULE DRIVE ADAPTER 9LET	IN	021782	021580						N
1 A 96720454	1.00	PC PWA-MODULE DRIVE ADAPTER 9LET	OUT	021951	032580						N
1 D 96752617	1.00	PC PWA-MODULE DRIVE ADAPTER 9HKT	OUT	021782	021580	AYH4					N
2 C 96870430	1.00	PC PWA-MODULE DRIVE ADAPTER 9KJT	IN	021545	100579	AYH4					N
3 A 96870930	1.00	PC CABLE ASSY-MODULE DRIVE BUS IN	IN	022210	032583						N
4 A 96870935	1.00	PC CABLE ASSY-MODULE DRV BUS OUT	IN	022210	032583						N
1 A 96890010	1.00	PC PWA-MODULE DRIVE ADAPTER 9HKT	IN	021951	032580						N
1 A 96890010	1.00	PC PWA-MODULE DRIVE ADAPTER 9HKT	OUT	022171	032382						N
1 A 96890063	1.00	PC PWA-MODULE DRIVE ADAPTER 81PST	IN	022171	032382						N
NUMBER OF LINE ITEMS = 9 HIGHEST FIND NUMBER = 4											

ASSEMBLY REV 1-80

SCMD

MFG INFO

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Figure 7-1. GB145-A Module Drive Adapter Spare Parts List

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	DS19375	CL A RELEASED	1/1	9-23-82		AW	
B	DS22210	ADDED FINIS 2 1 1	1/1	1-25-83		AW	
C	DS22257	ADDED VAL 2 1 1	1/1	1-25-83		AW	

DWN	B. J. Jones	9/1/82	 CONTROL DATA CORPORATION DATA SYSTEMS LA JOLLA DIVISION LA JOLLA CA 92037	TITLE		SPL - GB145-D	
CHKD	J. H. H. H.	5/24/83		STORAGE MODULE ADAPTER			
ENG	J. H. H. H.	6/1/83					
MFG	J. H. H. H.	6-2-2					
APP	J. H. H. H.	9-23-82			CODE IDENT	09132	DWG No
					A		88887265
			SCALE		1/1		88887265



ASSEMBLY PARTS LIST

88887265				C	A	A	SPL-GB145-D STOR MODULE ADAPTR				DSM	GB145D	08/13/82	022257	05/17/83		MF
ASSEMBLY NUMBER				REV	CL	OW	ASSEMBLY DESCRIPTION				DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	

FIND NUMBER	OW	REV	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH	SC	IN
5	A		96744226	1.00	PC	CABLE ASSY RUS IN EXPANSION	IN	022257	051783	AYM4	N		N
6	A		96744227	1.00	PC	CABLE ASSY RUS OUT EXPANSION	IN	022257	051783	AYM4	N		N
2	C		96870430	1.00	PC	PWA-MODULE DRIVE ADAPTER 9KJT	IN			AYM4	N		N
3	A		96870930	1.00	PC	CABLE ASSY-MODULE DRIVE RUS IN	IN	022210	032583		N		N
4	A		96870935	1.00	PC	CABLE ASSY-MODULE DRV RUS OUT	IN	022210	032583		N		N
1	A		96890090	1.00	PC	PWA MODULE DRIVE ADAPTER 82PFT	IN				N		N

NUMBER OF LINE ITEMS =				6
HIGHEST FIND NUMBER =				6

SCMD

MFG INFO

PRINTED IN U.S.A.
INTER-DIVISIONAL DOCUMENT

Figure 7-2. GB145-D Module Drive Adapter Spare Parts List

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
01	DS18940	CL. B. PRE-RELEASED	AW	11-17-78	AW	
A	DS21545	CL. A. RELEASED	AW	6-14-79	AW	
B	DS21782	CHG TO F/N 3	AW	10-29-79	AW	
C	DS21951	CHG'D F/N 3	AW	1-8-80	AW	
D	DS22171	CHG'D F/N 3	J.V.W.	5-31-82	AW	
E	DS22210	PL CHANGE ONLY	J.V.W.	1-25-83	AW	

DWN	R. P. R.	9-13-78	 CONTROL DATA CORPORATION DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037	TITLE		MODULE DRIVE ADAPTER	
CHKD	T. H. M.	11-9-78		CODE IDENT		09132	
ENG	S. H. K.	11-9-78		DWG No		96720052	
MFG	R. N. T.	11-17-78		SCALE		96752522	
APP	C. W. L.	11-17-78					



ASSEMBLY PARTS LIST

96720052		E	A	A	MODULE DRIVE ADAPTER	DSM	GB145A	11/13/78	022210	01/19/83	PR
ASSEMBLY NUMBER	REV	CL	ST	REV	ASSEMBLY DESCRIPTION	DESIGN SOURCE	PART USAGE	RELEASE DATE	CHANGE NO. NUMBER	PROCESSING DATE	PAGE NUMBER
FIND NUMBER	BY	DATE	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE NO. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PC NC
3	A	96720454	1.00	PC	PWA-MODULE DRIVE ADAPTER 9LET	IN	021782	021580			N
3	A	96720454	1.00	PC	PWA-MODULE DRIVE ADAPTER 9LET	OUT	021951	072580			N
4	A	96720677	1.00	PC	CABLE ASSY-MODULE DRIVE BUS IN	IN	018940	111378			N
4	A	96720677	1.00	PC	CABLE ASSY-MODULE DRIVE BUS IN	OUT	022210	032583			N
5	A	96720670	1.00	PC	CABLE ASSY-MODULE DRV BUS OUT	IN	018940	111378			N
5	A	96720670	1.00	PC	CABLE ASSY-MODULE DRV BUS OUT	OUT	022210	032583			N
1	C	96743750	1.00	PC	CABLE ASSY-STORAGE MOD BUS IN	OUT	021545	100579	AYM4		N
2	C	96743753	1.00	PC	CABLE ASSY-STORAGE MOD BUS OUT	OUT	021545	100579	AYM4		N
3	D	96752617	1.00	PC	PWA-MODULE DRIVE ADAPTER 8HKT	OUT	021782	021580	AYM4		N
6	C	96870430	1.00	PC	PWA-MODULE DRIVE ADAPTER 9KJT	IN	021545	100579	AYM4		N
4	A	96870930	1.00	PC	CABLE ASSY-MODULE DRIVE BUS IN	IN	022210	032583			N
5	A	96870935	1.00	PC	CABLE ASSY-MODULE DRV BUS OUT	IN	022210	032583			N
3	A	96890010	1.00	PC	PWA-MODULE DRIVE ADAPTER 8HKT	IN	021951	072580			N
3	A	96890010	1.00	PC	PWA-MODULE DRIVE ADAPTER 8HKT	OUT	022171	032382			N
3	A	96890063	1.00	PC	PWA-MODULE DRIVE ADAPTER 81PST	IN	022171	032382			N

NUMBER OF LINE ITEMS = 15
HIGHEST FIND NUMBER = 6

SCHD

MFG INFO

INTERDIVISIONAL DOCUMENT

Figure 7-3. Module Drive Adapter (96720052)

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	DS22171	CL A. RELEASE/INACTIVATE REPL BY NONE	BR	3-31-82		AN	
B	DS22248	PL CHANGE ONLY	JM	3-3-83		AN	

CAUTION:

THIS PWA CONTAINS ~~SENSITIVE~~ SENSITIVE DEVICES WHICH MAY BE PERMANENTLY DAMAGED BY IMPROPER HANDLING. OBSERVE HANDLING PROCEDURES OUTLINED IN CDC STD 100.010 & CDC ENGR SPEC 16013100 WHEN ASSEMBLING, INSTALLING, REMOVING OR TRANSPORTING THIS PWA.

INACTIVE

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.034.	DWN	P. R. R. 1-3-82	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA CA 92037	TITLE P.W. ASSY - BIPRT MODULE DRIVE ADAPTER			
	CHKD	P. R. R. 1-18-82					
	ENG	P. R. R. 3-31-82					
	APP	P. R. R. 3-31-82					
	INFO	A. M. C. 3/3/82		CODE IDENT	09132	A	DWG No
							96890060
			SCALE				

	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA CA 92037	2	96890060	L
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NOTES:

1. MARK PART NO. PER CDC SPEC 88818000.
- 2.
3. 3 INSTALL (F/N 1) ROM SET PER TABLE BELOW:
INSURE I.C. PIN 1 MATCHES SOCKET PIN 1

ROM SET	
PART NO.	LOCATION
96755004	@C1 (BITS 16-23)
96755005	@E1 (BITS 08-15)
96755006	@D1 (BITS 00-07)

4. 4 INSTALL FPLA'S PER TABLE BELOW:
INSURE I.C. PIN 1 MATCHES SOCKET PIN 1

FPLA	
PART NO.	LOCATION
96860504	@F10/11 (AQ)
96860505	@L 3/4 (DMA 1)
96860506	@M 3/4 (DMA 2)

Figure 7-4. Module Drive Adapter PWA (96890060) (Sheet 1 of 3)

ASSEMBLY PARTS LIST

96890060	R	I	A	PWA-MODULE DRIVE ADAPTER 81PRT	DS	GB145B	03/23/82	022268	02/22/83	MF
ASSEMBLY NUMBER	REV	CL	CH	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

LINE NUMBER	QTY	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PH	OR
1	A	9675438A	1.000	PC	ROM SET,SMD ADAPTER	IN			AYM4	N	
2	A	96860504	1.000	PC	IC-FPLA,MODULE DR ADAPTER,AQ	IN	022268	022283	AYM4	N	
3	A	96860505	1.000	PC	IC-FPLA,MODULE DR ADAPTER,DMA1	IN			AYM4	N	
4	A	96860506	1.000	PC	IC-FPLA,MODULE DR ADAPTER,DMA2	IN			AYM4	N	
5	D	96890059	1.000	PC	PW SUBASSY-MOD DRIVE ADAPTER	IN				N	
6	C	96890061	REF	PC	LOGIC DIAG-MOD DRV ADPTR 81PRT	IN				N	
- INACTIVE -											
NUMBER OF LINE ITEMS = 6						HIGHEST LINE NUMBER = 6					

SCMD REV 2-82 MFG INFO

PRINTED IN U.S.A.

Figure 7-4. Module Drive Adapter PWA (96890060) (Sheet 3 of 3)

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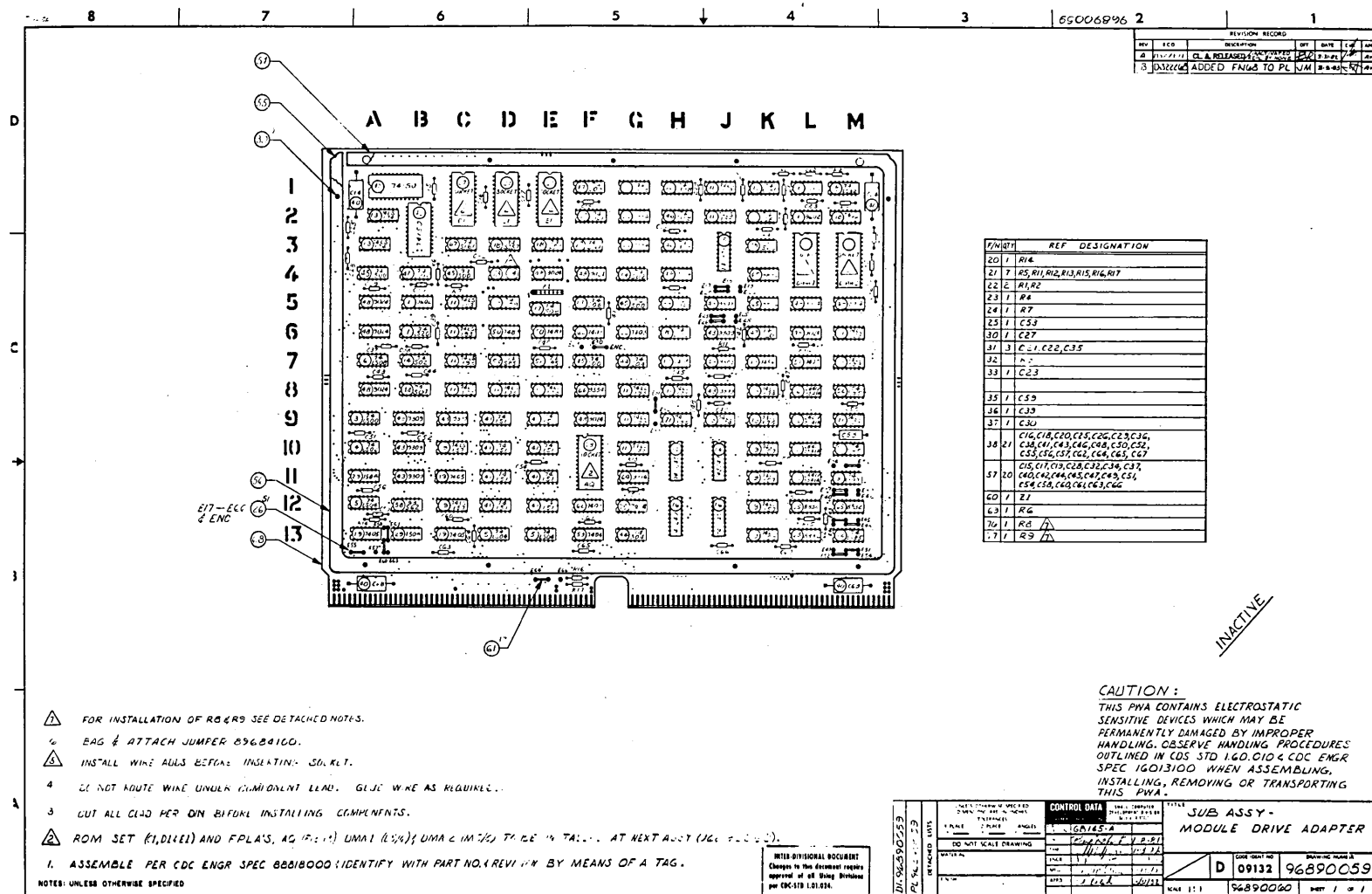
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DWN	Ben R. G. 5/1/82	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA CA 92037	TITLE	SUB ASSY - MODULE DRIVE ADAPTER	PREFIX	DN	DOCUMENT NO.	96890059	REV.	P
CHKD	1/2/82		FIRST USED ON							
ENG										
MFG										
APPR										

SHEET REVISION STATUS										REVISION RECORD				
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP								
A	DS22171	CL. A. RELEASED / INACTIVATED REPL BY NONE	BR	5-31-82										
INACTIVE														

NOTES:

DETACHED LISTS

AAS100 REV. 8/71 PRINTED IN U.S.A.

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA CA 92037	CODE IDENT 09132	DN	DOCUMENT NO. 96890059	REV. A
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A CUT CLAD PER SHEETS 3,4,5 & 6

B CAUTION
LOCATION D4 IS A 14 PIN DEVICE
IN A 16 PIN CONFIGURATION. PIN 1 OF
SOCKET TO D4 -1. INSTALL WIRE ADDS
BEFORE INSERTING SOCKET.

C ADD WIRE (F/N72) PER SHEETS: 7 THRU 16

D ADD RESISTORS R8 & R9 (FN 76 & 77) AS SHOWN
ON PAGE 17.

AAS105 PRINTED IN U.S.A.

Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 2 of 11)

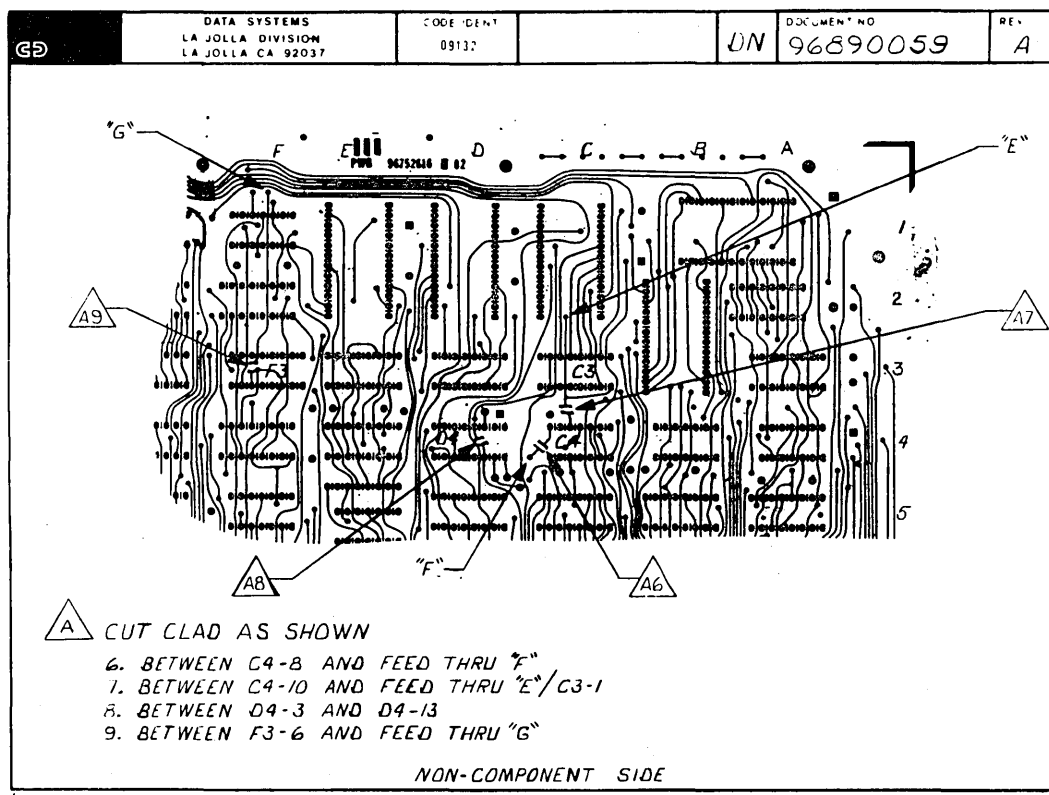
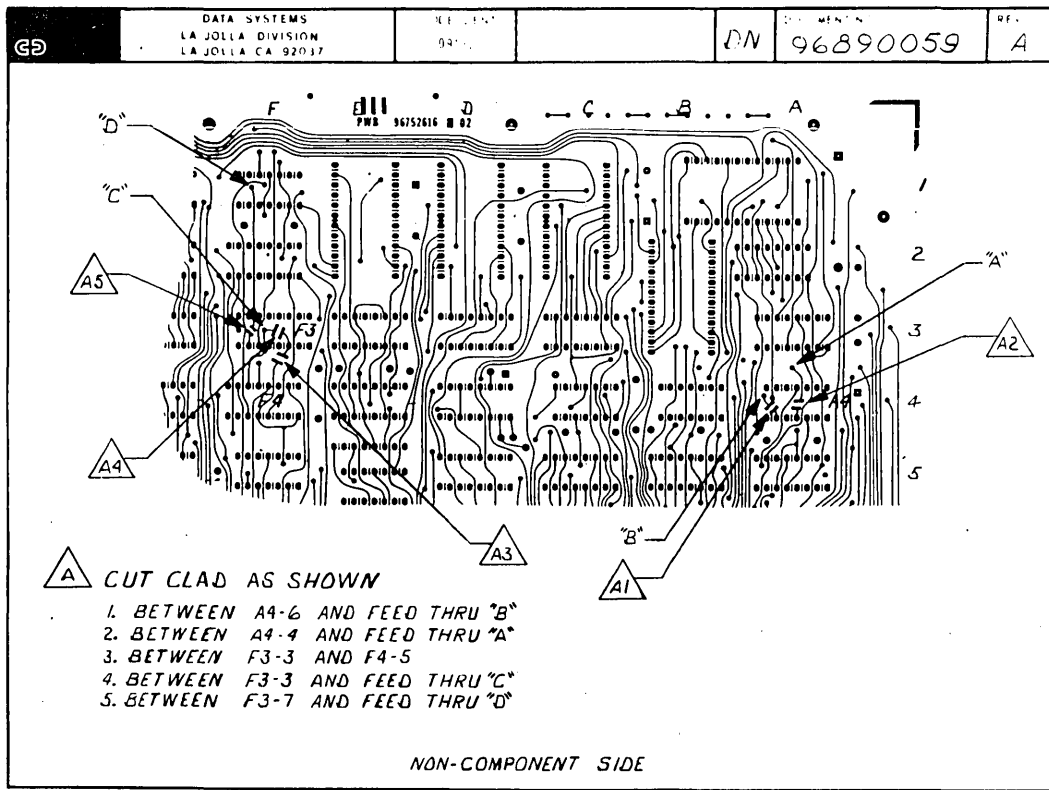


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 3 of 11)

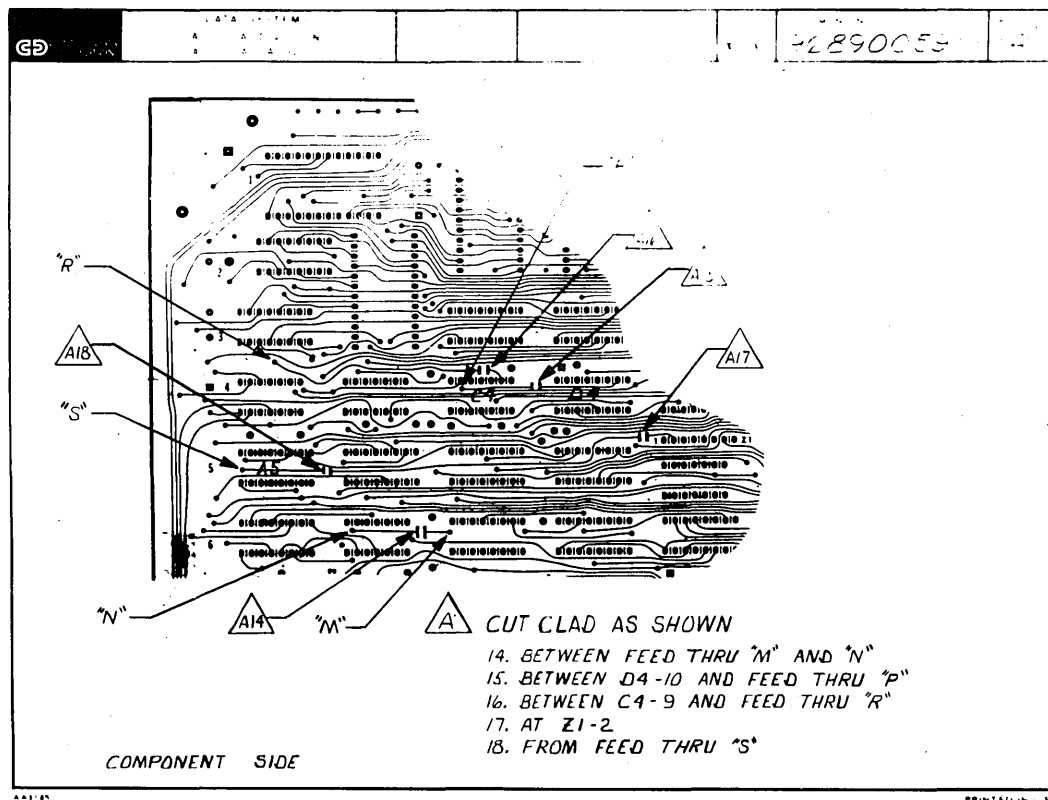
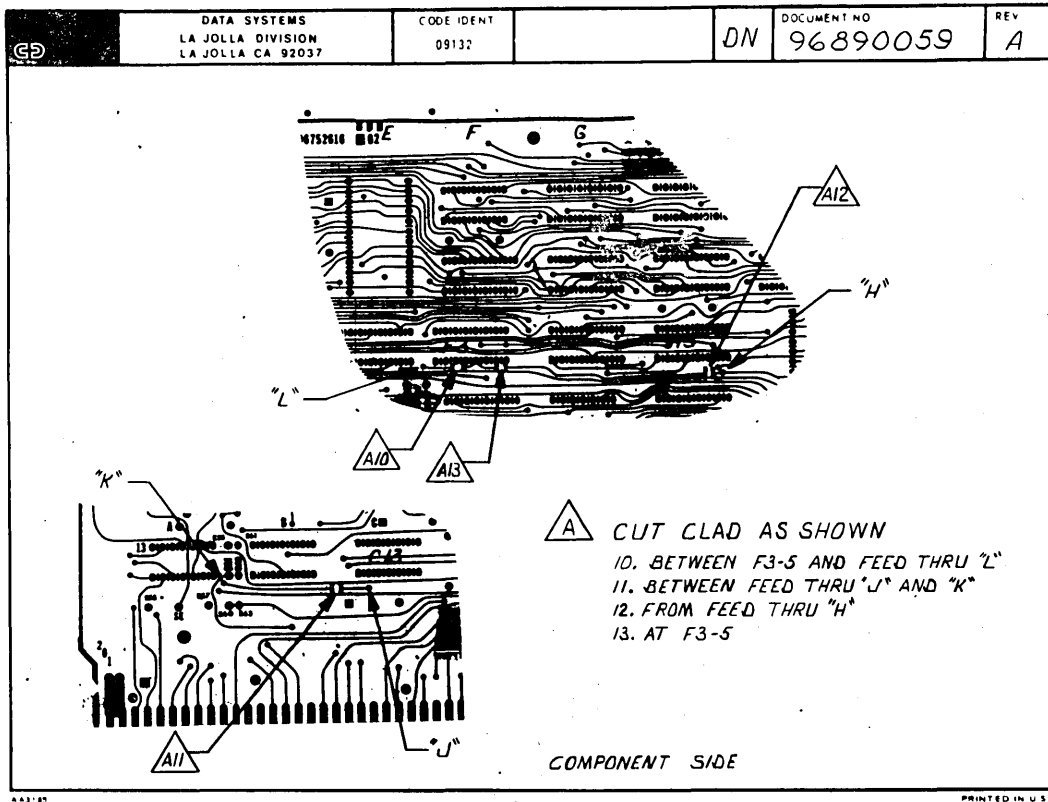


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 4 of 11)

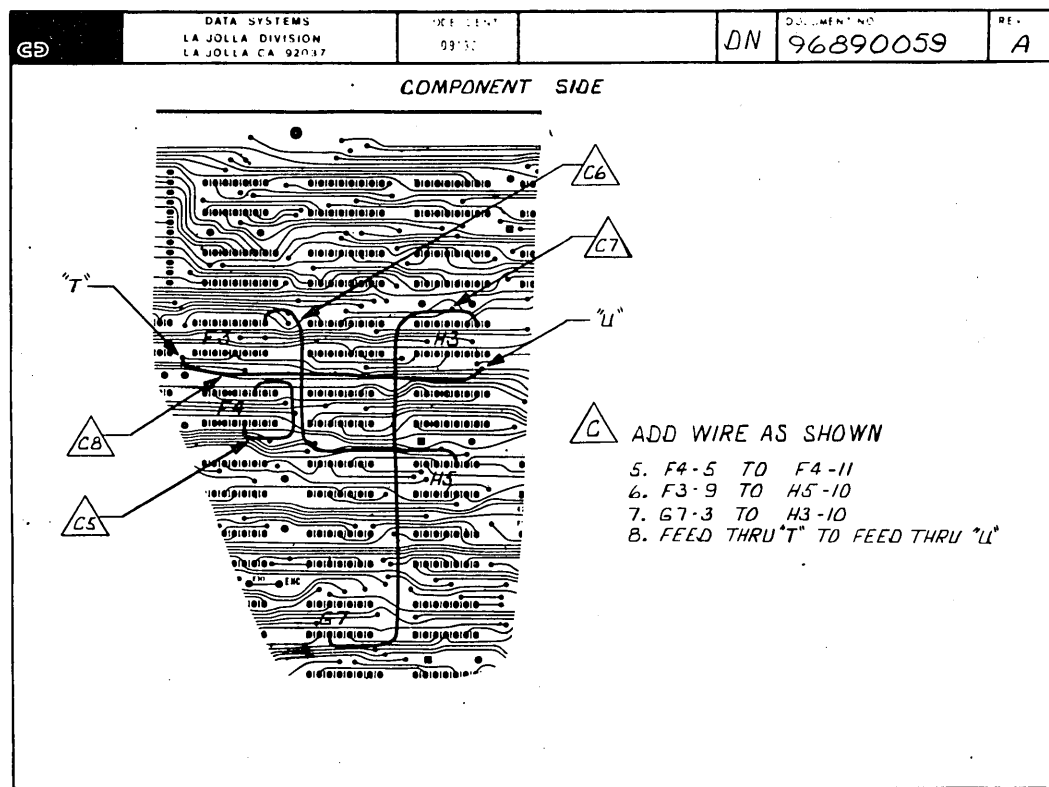
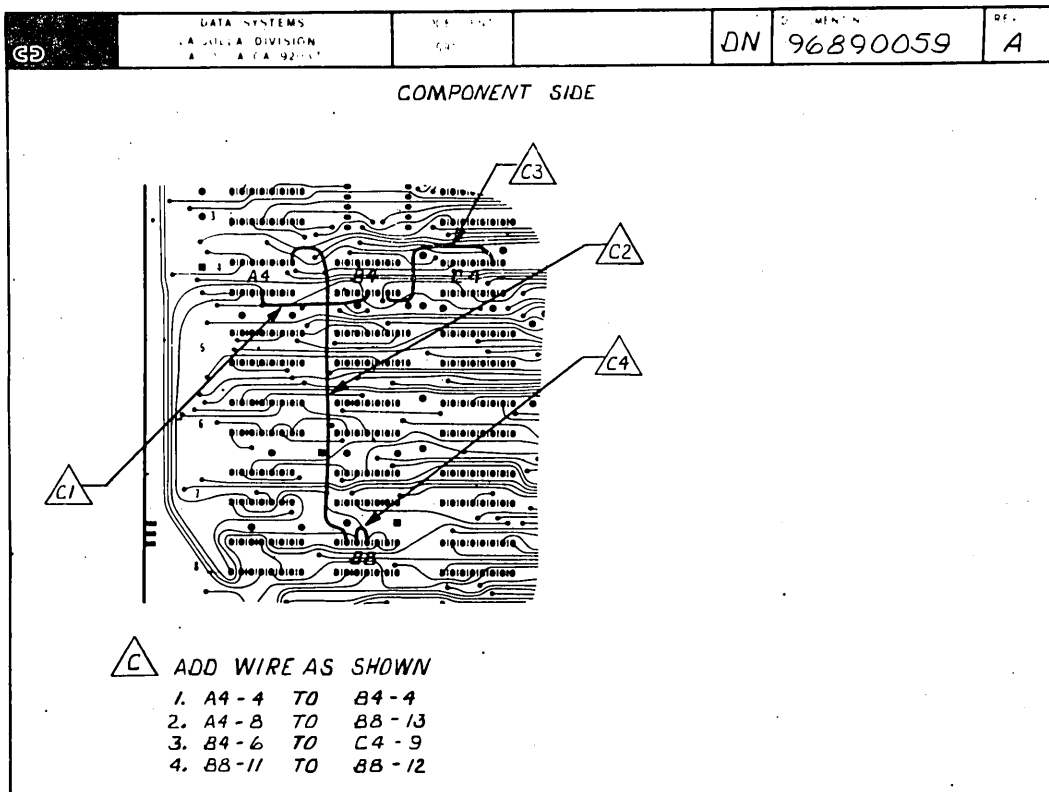


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 5 of 11)

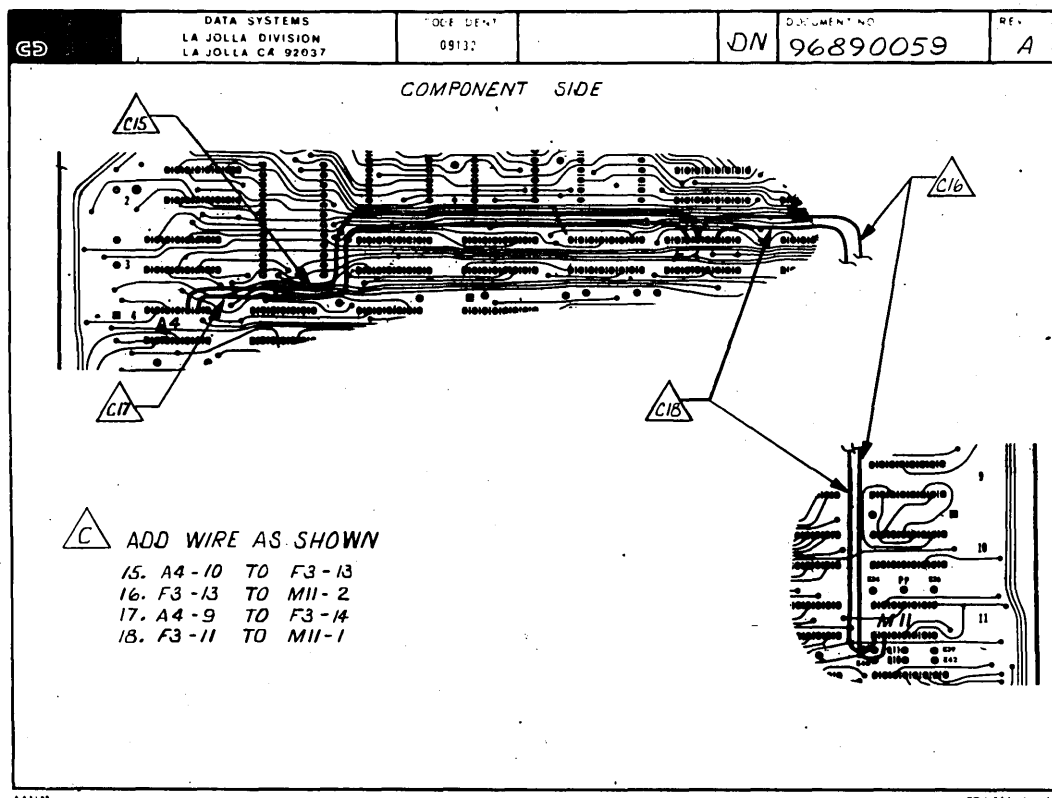
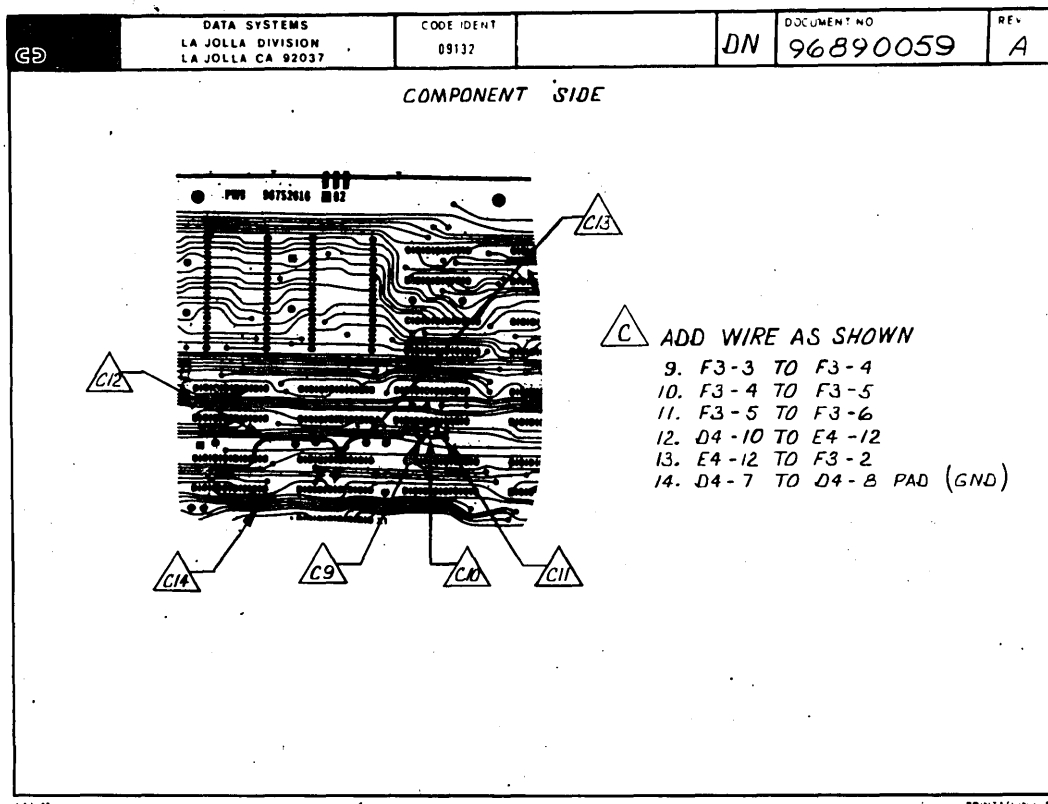


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 6 of 11)

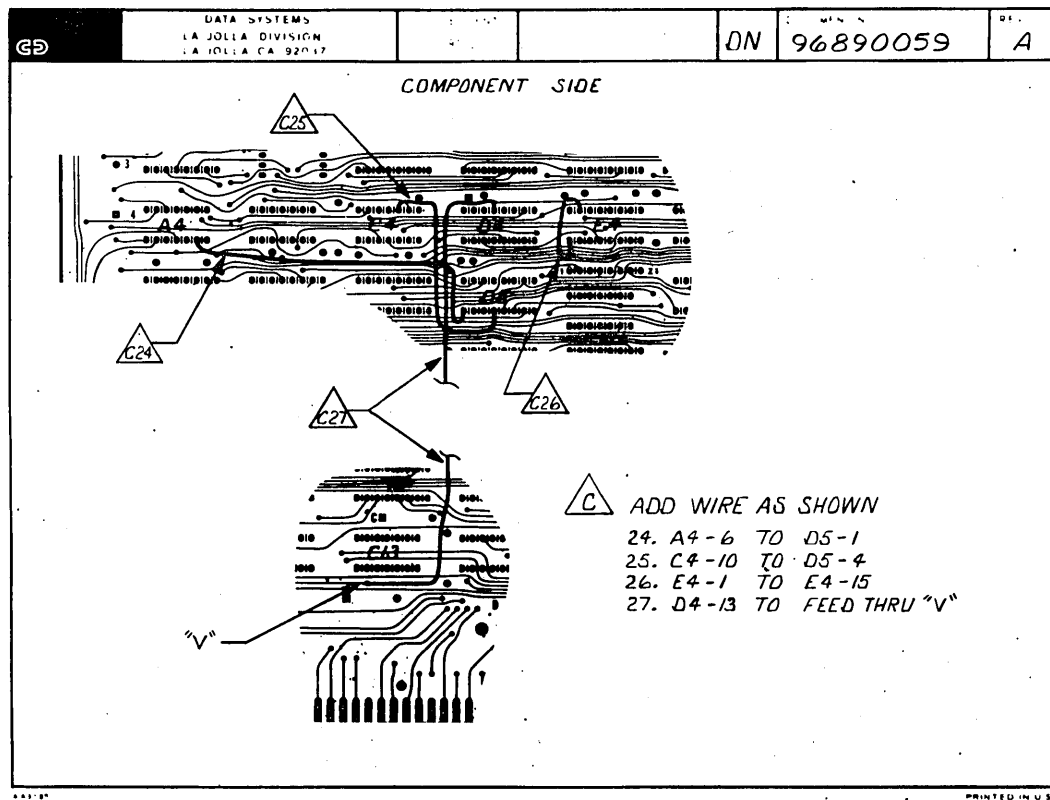
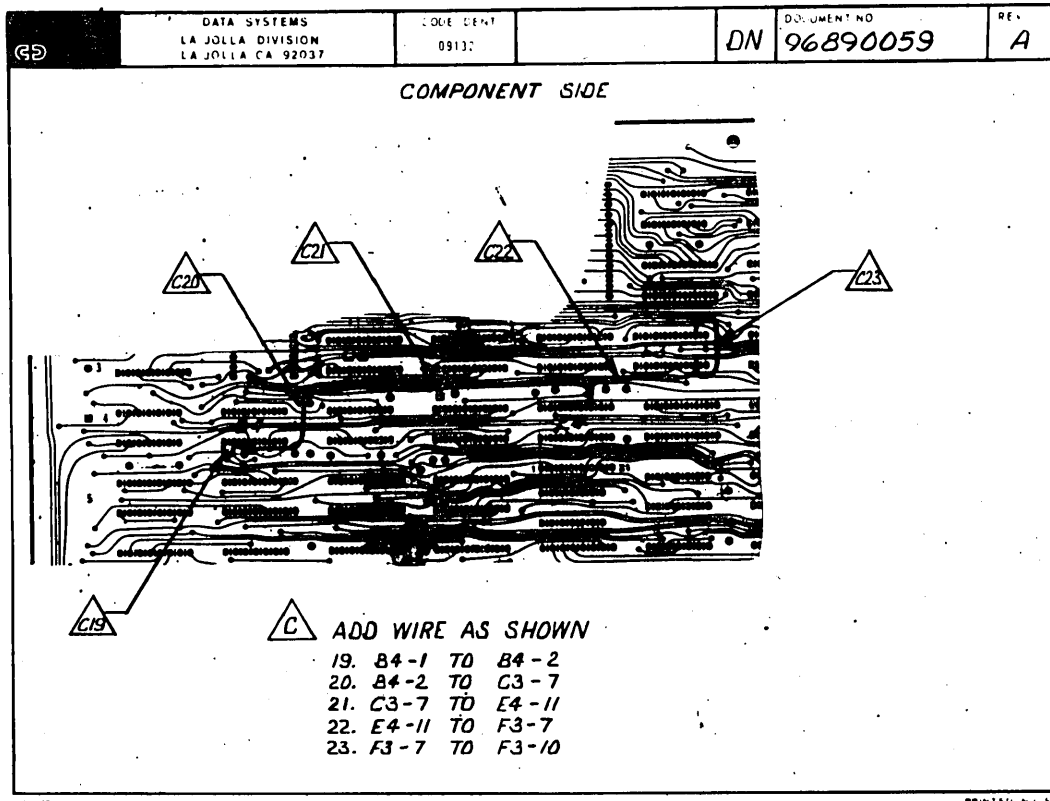


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 7 of 11)

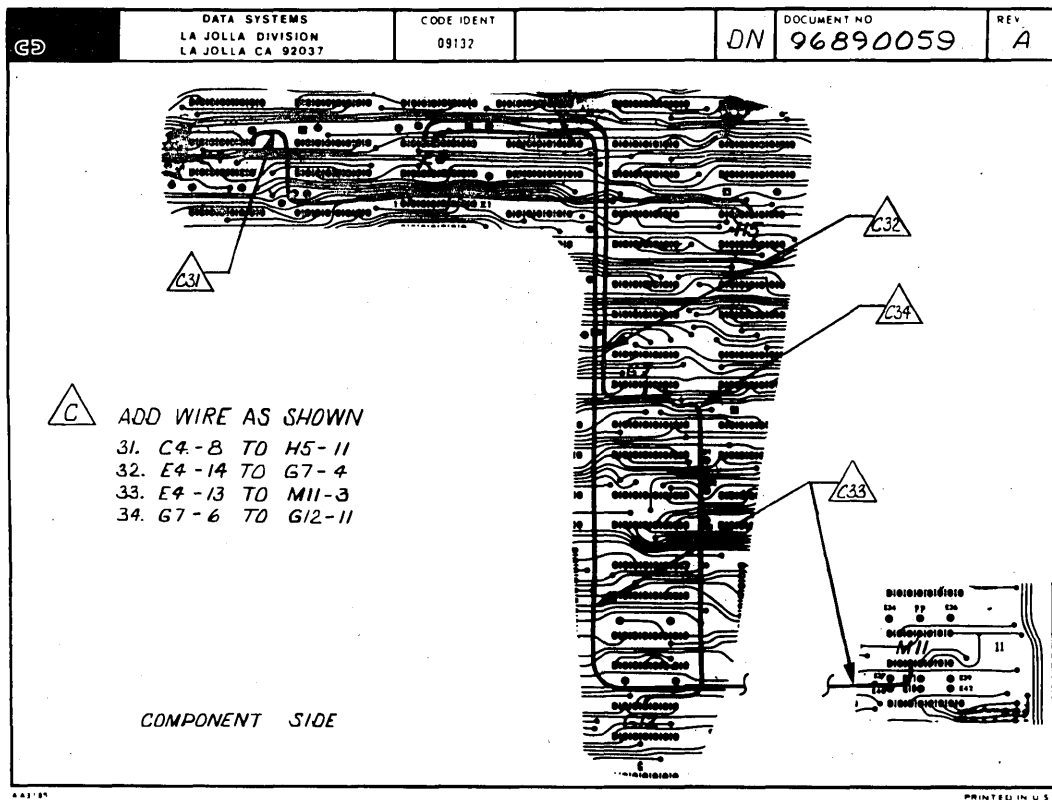
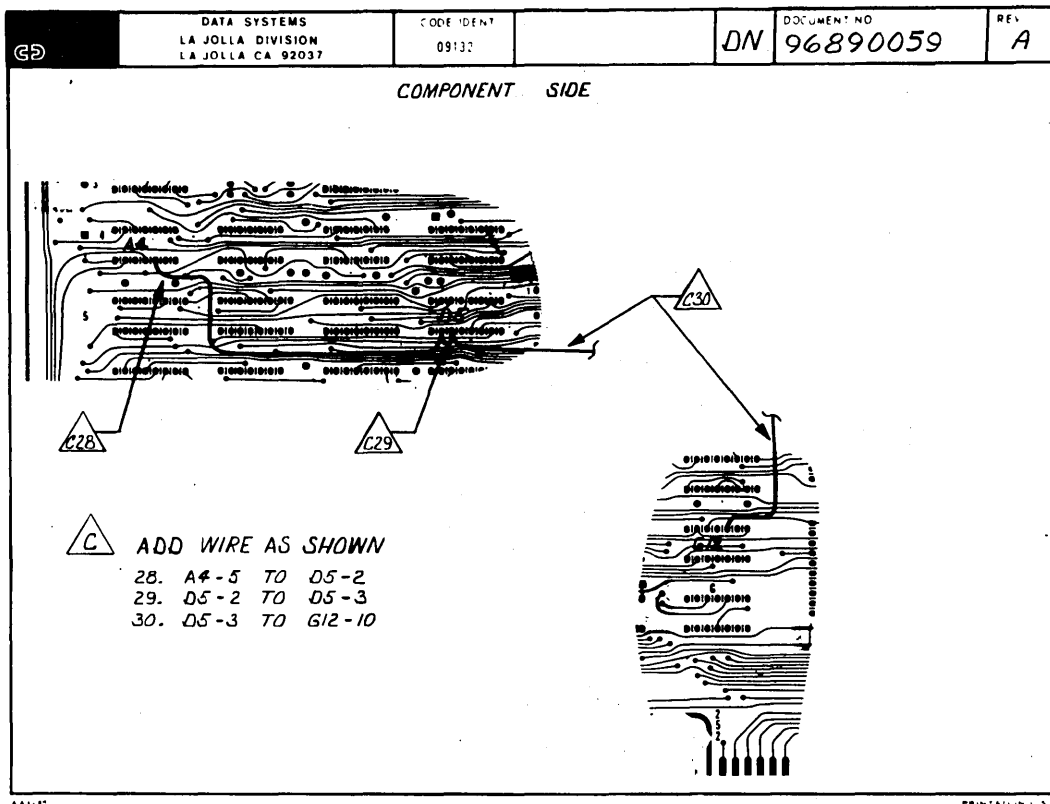


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 8 of 11)

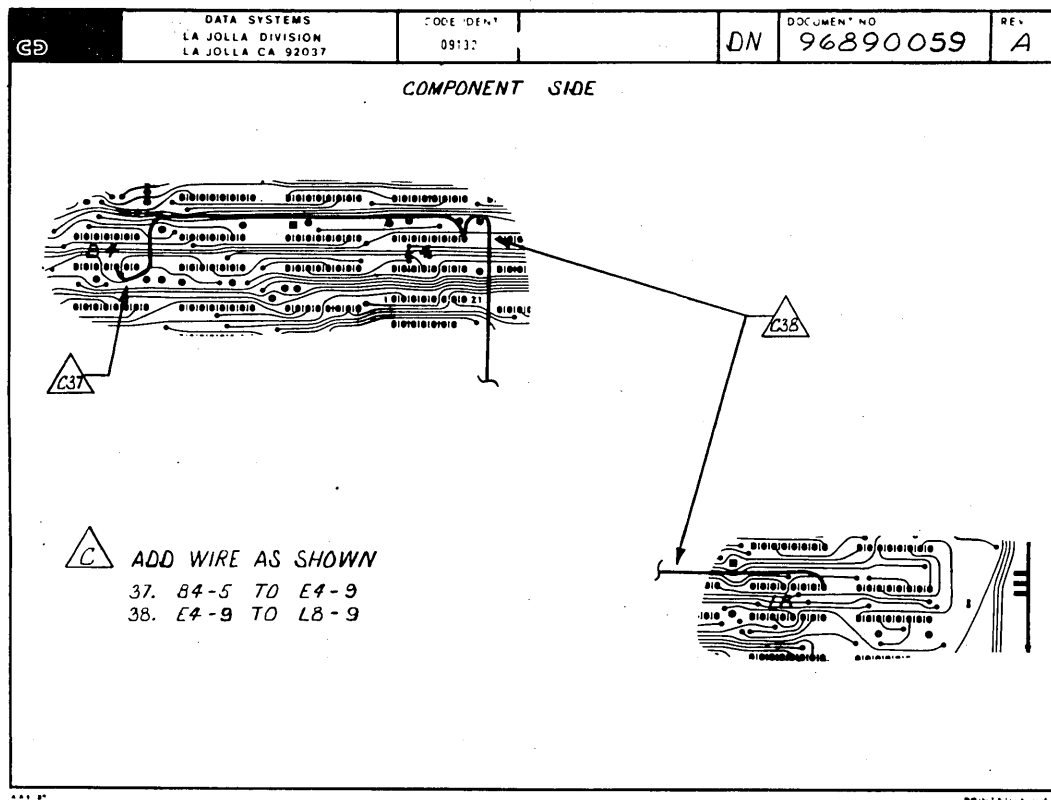
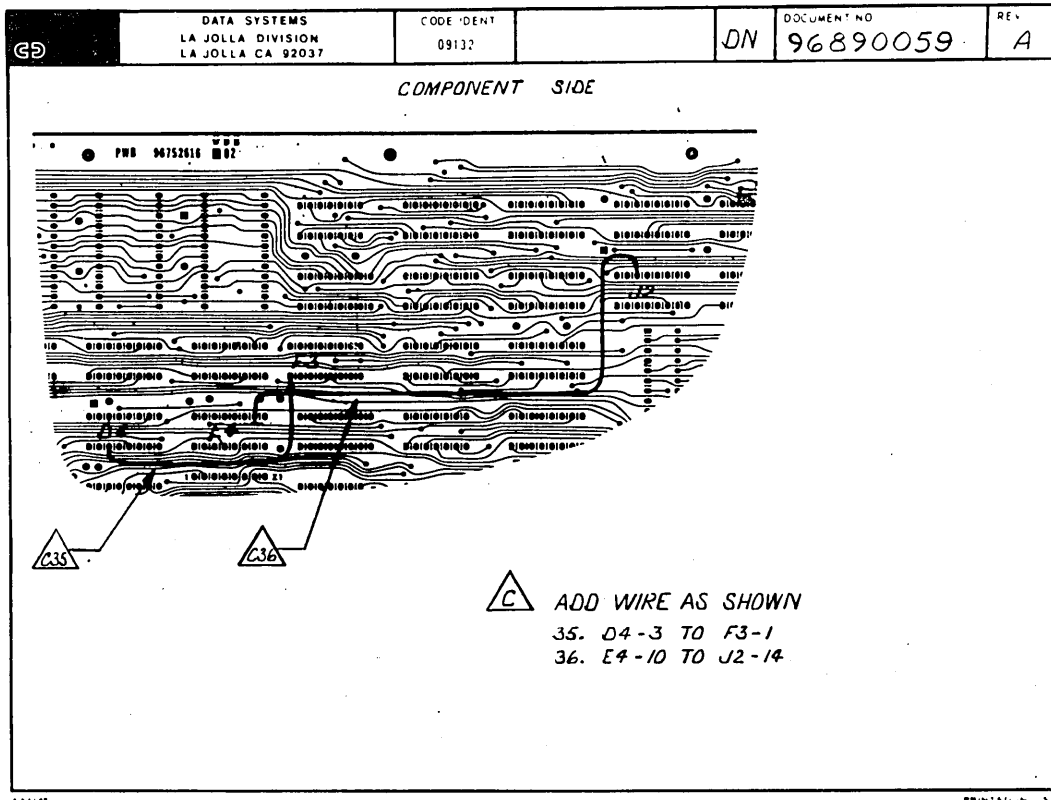


Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 9 of 11)

ASSEMBLY PARTS LIST

96890059	H	I	D	PW SUBASSY-MOD DRIVE ADAPTER	NS	GR145H	03/23/82	02226H	02/22/83		MF
ASSEMBLY NUMBER	REV	CL	OW SD	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING NUMBER	PAGE NUMBER	

PIN NO	PART NUMBER	QUANTITY	UNIT LABEL	PART DESCRIPTION	IN/OUT STATUS	CHARGE GRP. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PC
1	A 15104301	3.	PC	IC 9602 MULTVIR,DUAL RETRIG	IN			PPPA	PC
2	A 15126800	4.	PC	IC REG.MOS 256-BIT 64X4 FIFO	IN			PPPA	PC
3	A 15144900	2.	PC	IC TTL QUAD 2-IN NAND 74LS00	IN			PPPA	PC
4	A 15145000	1.	PC	IC TTL QUAD 2-INPUT NOR 74LS02	IN			PPPA	PC
5	A 15145100	3.	PC	IC TTL HEX INVERTER 74LS04	IN			PPPA	PC
6	A 15145400	1.	PC	IC TTL QUAD 2INPUT AND 74LS08	IN			PPPA	PC
7	A 15145900	1.	PC	IC TTL DUAL 4INPUT NAND 74LS20	IN			PPPA	PC
8	A 15146200	2.	PC	IC TTL QUAD 2INPUT OR 74LS32	IN			PPPA	PC
9	A 15146700	6.	PC	IC MULTII,TTL QUAD 2 74LS157	IN			PPPA	PC
10	A 15146900	1.	PC	IC-TTL,LATCH 4 BIT 74LS175	IN			PPPA	PC
11	A 15147000	15.	PC	IC COUNTER TTL 4-BIT 74LS193	IN			PPPA	PC
12	A 15147200	2.	PC	IC-74LS85 TTL 4 BIT COMPARATOR	IN			PPPA	PC
13	A 15147500	5.	PC	IC LATCH-STTL 4-BIT D-TYPE	IN			PPPA	PC
14	A 15158500	2.	PC	IC-TTL QUAD 2 INPUT NOR 74S02	IN			PPPA	PC
19	A 15161300	4.	PC	I.C. TYPE 7405 TTL-HEX INVERT.	IN			PPPA	PC
15	A 15162800	1.	PC	IC-OCTAL LATCH,TTL 74S373	IN			PPPA	PC
16	A 1516321A	4.	PC	IC 74S240	IN			PPPA	PC
17	A 15163600	4.	PC	IC 74S08A	IN			PPPA	PC
71	A 171A4200	1.	PC	INTEGRATED CIRCUIT TTL 74193	IN			PPPA	PC
69	C 17705905	1.	PC	RES FXD .25W 51000 OHMS	IN			PPPA	PC
20	C 245000051	1.	PC	RES FXD .25W 330 OHMS	IN			PPPA	PC
21	C 245000063	7.	PC	RES FXD .25W 1000 OHMS	IN			PPPA	PC
22	C 245000080	2.	PC	RES FXD .25W 5100 OHMS	IN			PPPA	PC
32	C 2450000A1	1.	PC	RES FXD .25W 5600 OHMS	IN			PPPA	PC
23	C 245000084	1.	PC	RES FXD .25W 7500 OHMS	IN			PPPA	PC
24	C 245000091	1.	PC	RES FXD .25W 15000	IN			PPPA	PC
25	C 245004382	1.	PC	CAP,FXD SOLID TANTALUM	IN			PPPA	PC
76	C 245633025	1.	PC	RES FXD COMP 1/4W 330 OHMS	IN			PPPA	PC
77	C 245633026	1.	PC	HFS FXD COMP 1/4W 390 OHMS	IN			PPPA	PC
26	A 39397400	51.	PC	SOCKET, MINIATURE SPRING	IN			PPPA	PC
27	A 51858100	3.	PC	SOCKET,IC,PC TYPE 24 PIN	IN			PPPA	PC
28	A 51858101	3.	PC	SOCKET,IC,PC TYPE 24 PIN	IN			PPPA	PC
72	C 52629940	60.	IN	WIRE ELEC 30 GA WHITE	IN			PPPA	PC
29	A 75009911	2.	PC	RESISTOR MODULE 150 OHMS 2 0/0	IN			PPPA	PC
30	A 84996701	1.	PC	CAP,CER 100V 10 PF	IN			PPPA	PC
31	A 84996713	3.	PC	CAP,CER 100V 100 PF	IN			PPPA	PC

SECRET-1 REV 2-88 MFG INFO

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- INACTIVE -

Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 10 of 11)

ASSEMBLY PARTS LIST

96890059	R	I	D	PW SUBASSY-MOD DRIVE ADAPTER	DS	GR145R	03/23/82	022268	02/22/83	MF
ASSEMBLY NUMBER	REV	CL	SW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	SW	PART NUMBER	QUANTITY	UNIT MEAS	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PN	OR	NC
33	A	84996717	1.00	PC	CAP,CER 100V 220 PF	IN			PPP4	N		
35	A	84996721	1.00	PC	CAP,CER 100V 470 PF	IN			PPP4	N		
36	A	84996730	1.00	PC	CAP,CER 100V 1200 PF	IN			PPP4	N		
37	A	84996740	1.00	PC	CAP,CER 100V 6800 PF	IN			PPP4	N		
38	A	84996743	21.00	PC	CAP,CER 160V .01 MF	IN			PPP4	N		
39	A	88R12400	9.00	PC	RIVET-SEMI-TUBULAR,BRS .312 LG	IN			PPP4	N		
40	A	88R80500	4.00	PC	CAP ELECT-ALUM 16VDC 100UF	IN			PPP4	N		
41	A	88R81100	8.00	PC	IC 74151A TTL DATA SEL MUX	IN			PPP4	N		
42	A	88R81300	2.00	PC	IC 74150 TTL 16-RIT SEL/MUX	IN			PPP4	N		
18	A	88R83300	2.00	PC	IC 745257 QUAD 2-L D SEL/MUX	IN			PPP4	N		
43	A	88R83400	8.00	PC	IC 9309 TTL DUAL 4-INPUT MUX	IN			PPP4	N		
44	A	88R83700	4.00	PC	IC 74504 SCHOTTKY TTL HEX INV	IN			PPP4	N		
45	A	88R84500	4.00	PC	IC 74500 SCHOTTKY TTL QUAD 2-I	IN			PPP4	N		
46	A	88R85100	4.00	PC	IC 74513A TTL DECODER/MUX	IN			PPP4	N		
47	A	88R85300	2.00	PC	IC 74520 SCHOTTKY TTL DUAL 4-I	IN			PPP4	N		
48	A	88R85400	10.00	PC	IC 9024 TTL DUAL FLIP/FLOP	IN			PPP4	N		
49	A	88R85700	1.00	PC	IC 7486 TTL QUAD 2-IN EXCL OR	IN			PPP4	N		
50	A	88R86100	2.00	PC	IC 7489 TTL 64 RIT RAM	IN			PPP4	N		
51	A	88R86700	1.00	PC	IC 7475 TTL 4-RIT BISTAR LATCH	IN			PPP4	N		
52	A	88R891600	4.00	PC	IC 74585 TTL 4-RIT MAGN COMPAR	IN			PPP4	N		
75	A	88R896100	1.00	PC	IC 7414 TTL HEX SCHMITT TRIGER	IN			PPP4	N		
54	C	88R96600	1.00	PC	INSULATOR-CARD FRAME,UPPER	IN			PPP4	N		
55	C	88R96700	1.00	PC	INSULATOR-CARD FRAME,LOWER	IN			PPP4	N		
56	C	88R96800	1.00	PC	FRAME-CARD (CASTING)	IN			PPP4	N		
57	A	88R97800	20.00	PC	CAP-FIXED SOLID TANT,6VDC,12UF	IN			PPP4	N		
58	A	88R22800	2.00	PC	IC 93562/R2S62 TTL PAR/GEN/CHK	IN			PPP4	N		
59	A	88R24500	1.00	PC	IC 7404 TTL HEX INVERTER	IN			PPP4	N		
60	A	88R24706	1.00	PC	RES NETWORK-SIP,8 PIN,1,K OHM	IN			PPP4	N		
61	A	89R684100	17.00	PC	CONNECTOR PLUG TWO PIN JUMPER	IN			PPP4	N		
73	C	94260300	1.00	PC	SOCKET I.C.	IN			PPP4	N		
13	A	95R65100	5.00	PC	IC LATCH 4RIT D TYPE74LS174	IN			PPP4	N		
62	A	96744154	3.00	PC	IC 7403 TTL QUAD 2-IN POS NAND	IN			PPP4	N		
63	A	96744157	1.00	PC	IC 74279 TTL S-R LATCH	IN			PPP4	N		
64	A	96744170	1.00	PC	IC 9314 TTL 4-RIT LATCH	IN			PPP4	N		
65	A	96744215	5.00	PC	IC 8R32 TTL DUAL DIFF LINE DR	IN			PPP4	N		
66	A	96745400	3.00	PC	IC 9334 TTL 8-RIT ADDRESS LATCH	IN			PPP4	N		

SCMT-1 REV 2-82 MFG INFO

PRINTED IN U.S.A.

- INACTIVE -

ASSEMBLY PARTS LIST

96890059	B	I	D	PW SUBASSY-MOD DRIVE ADAPTER	DS	GR145R	03/23/82	022268	02/22/83	MF
ASSEMBLY NUMBER	REV	CL	SW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	SW	PART NUMBER	QUANTITY	UNIT MEAS	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PN	OR	NC
67	A	96745500	3.00	PC	IC 74S161 TTL 4-BIT BINARY CTR	IN			PPP4	N		
68	D	96752616	1	PC	PWR-MODULE DRIVE ADAPTER	IN	022268	02/22/83	PPP4	N		
74	A	96860402	1	PC	OSCILLATOR-HBD CLK,20.2752 MHZ	IN			PPP4	N		

- INACTIVE -

NUMBER OF LINE ITEMS = 75
HIGHEST FIND NUMBER = 77

CPWR-1 REV 2-82 MFG INFO

PRINTED IN U.S.A.

Figure 7-5. Module Drive Adapter Subassembly (96890059) (Sheet 11 of 11)

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	APP	APP
A	DS22171	CL. A. RELEASED	ER	3-31-82	AW	

CAUTION:
 THIS PWA CONTAINS ~~ELECTROSTATIC~~
 SENSITIVE DEVICES WHICH MAY BE
 PERMANENTLY DAMAGED BY IMPROPER
 HANDLING. OBSERVE HANDLING PROCEDURES
 OUTLINED IN CDC STD 160.010 & CDC ENGR
 SPEC 16013100 WHEN ASSEMBLING, INSTALLING,
 REMOVING OR TRANSPORTING THIS PWA.

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.	DWN	B. Roberts	2/14/81	 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037	TITLE		PWA - 81PST MODULE DRIVE ADAPTER	
	CHKD	M. J. J.	1-13-81		CODE IDENT		09132	
	ENG	A. J. J.	3-21-82		DWG No		96890063	
	MFG	A. J. J.	3/31/82					
	APP	A. J. J.	3/31/82					
			SCALE					

AAL6030

 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037	CODE IDENT 09132		96890063	A
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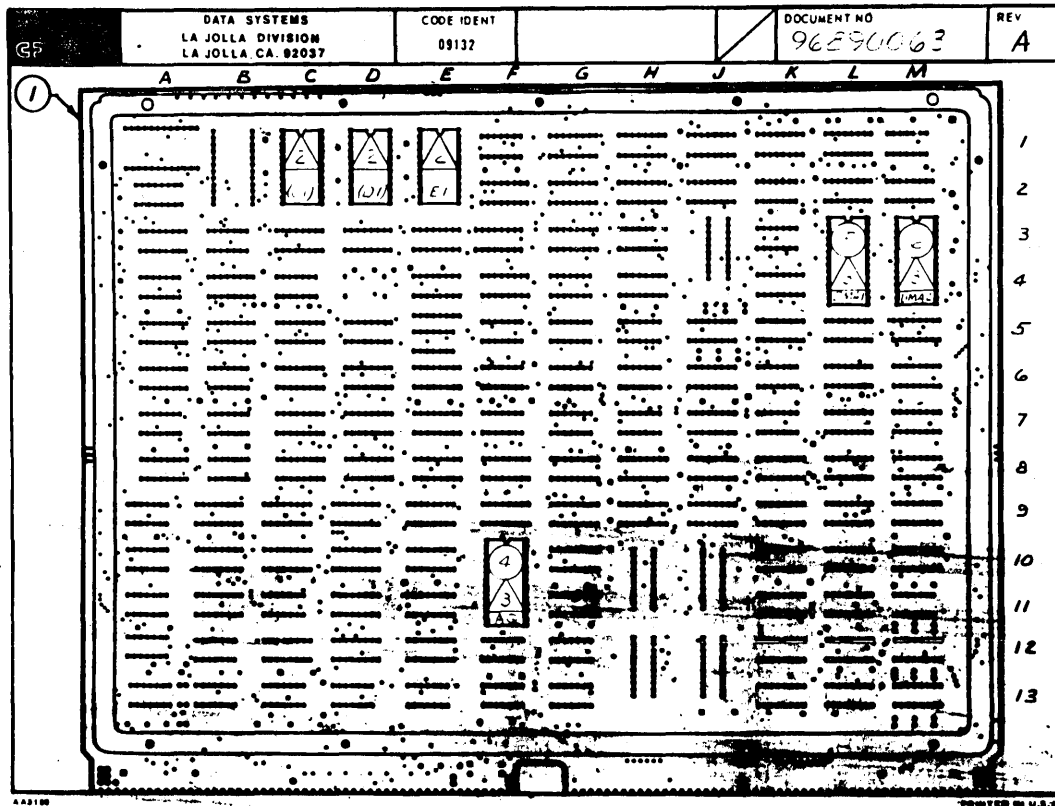
NOTES:

1. MARK PART NO. PER CDC SPEC 88818000.
2. INSTALL F/W 3 PER TABLE BELOW:
 (INSURE I.C. PIN 1 MATCHES SOCKET PIN 1)

ROM SET	
PART NO.	LOCATION
96755004	• C1 (BITS 16-23)
96755005	• E1 (BITS 08-15)
96755006	• D1 (BITS 00-07)
3. INSTALL FPLA'S PER TABLE BELOW:
 (INSURE I.C. PIN 1 MATCHES SOCKET PIN 1)

FPLA	
PART NO.	LOCATION
96860504	• F10 (AQ)
96860505	• L3 (DMA1)
96860506	• M3 (DMA2)

Figure 7-6. Module Drive Adapter PWA (96890063) (Sheet 1 of 2)



CD CONTROL DATA CORPORATION

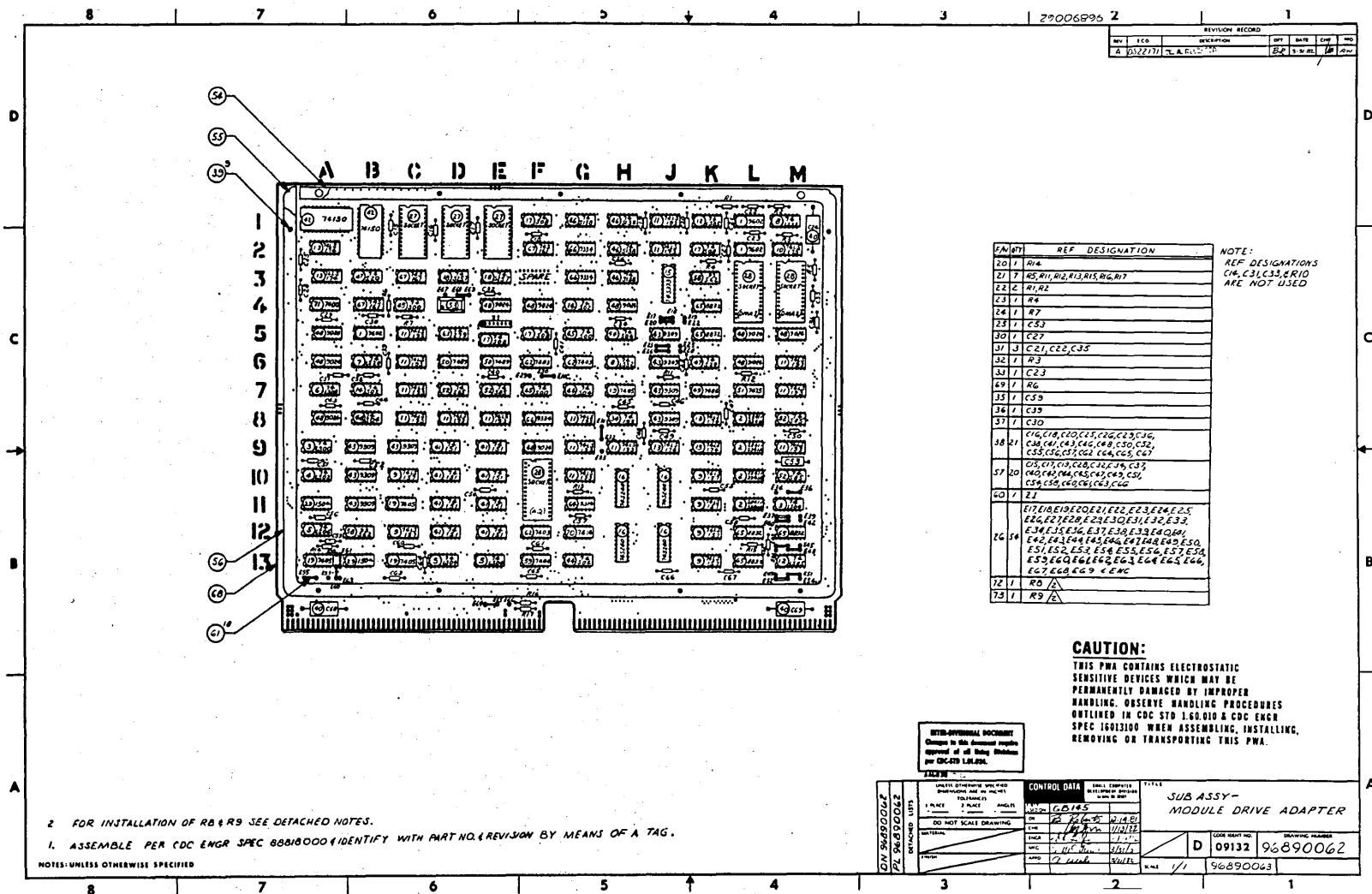
ASSEMBLY PARTS LIST

96890063		A	A	A	PWA-MODULE DRIVE ADAPTER 81PST		DS	6B145A	03/23/82		03/23/82		MF
ASSEMBLY NUMBER		REV	CL	OW	EE	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER
FIND NUMBER	QTY	PART NUMBER		QUANTITY	UNIT	PART DESCRIPTION		IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MARK IN/OUT	PART TYPE	PH OR
3	A	96754388		1.00	PC	ROM SET,SMD ADAPTER		IN				AYM4	N
4	A	96860504		1.00	PC	IC-FPLA,MODULE DR ADAPTER,AQ		IN				AYM4	N
5	A	96860505		1.00	PC	IC-FPLA,MODULE DR ADAPTER,DMA1		IN				AYM4	N
6	A	96860506		1.00	PC	IC-FPLA,MODULE DR ADAPTER,DMA2		IN				AYM4	N
1	D	96890062		1.00	PC	PW SURASSY-MOD DRIVE ADAPTER		IN					N
2	C	96890064		REF	PC	LOGIC DIAG-MOD DRV ADPTR 81PST		IN					N
NUMBER OF LINE ITEMS = 6													
HIGHEST FIND NUMBER = 6													

SCMD MF6 INFO

Figure 7-6. Module Drive Adapter PWA (96890063) (Sheet 2 of 2)

Figure 7-7. Module Drive Adapter Subassembly (96890062) (Sheet 1 of 4)



ASSEMBLY PARTS LIST

96890062		A	A	D	PW SUBASSY-MOD DRIVE ADAPTER	DS	GB145A	03/23/82		03/23/82	MF
ASSEMBLY NUMBER		REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORB. NUMBER	PROCESSING DATE	PAGE NUMBER
PART NUMBER	QTY	PART NUMBER	QTY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORB. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PH	PC
1	A	15104301	3.00	PC	IC 9602 MULTIVIB,DUAL RETRIG	IN			PPP4	N	
2	A	15126800	4.00	PC	IC REG,MOS 256-BIT 64X4 FIFO	IN			PPP4	N	
3	A	15144900	2.00	PC	IC TTL QUAD 2-IN NAND 74LS00	IN			PPP4	N	
4	A	15145000	1.00	PC	IC TTL QUAD 2-INPUT NOR 74LS02	IN			PPP4	N	
5	A	15145100	3.00	PC	IC TTL HEX INVERTER 74LS04	IN			PPP4	N	
6	A	15145400	1.00	PC	IC TTL QUAD 2INPUT AND 74LS08	IN			PPP4	N	
7	A	15145900	1.00	PC	IC TTL DUAL 4INPUT NAND 74LS20	IN			PPP4	N	
8	A	15146200	2.00	PC	IC TTL QUAD 2INPUT OR 74LS32	IN			PPP4	N	
9	A	15146700	6.00	PC	IC MULTI,TTL QUAD 2 74LS157	IN			PPP4	N	
10	A	15146900	1.00	PC	IC-TTL,LATCH 4 BIT 74LS175	IN			PPP4	N	
11	A	15147000	15.00	PC	IC COUNTER TTL 4-BIT 74LS193	IN			PPP4	N	
12	A	15147200	2.00	PC	IC-74LS85 TTL 4 BIT COMPARATOR	IN			PPP4	N	
14	A	15154500	2.00	PC	IC-TTL QUAD 2 INPUT NOR 74S02	IN			PPP4	N	
19	A	15161300	4.00	PC	IC,C. TYPE 7405 TTL-HEX INVERT.	IN			PPP4	N	
15	A	15162800	1.00	PC	IC-OCTAL LATCH,TTL 74S373	IN			PPP4	N	
16	A	15163218	4.00	PC	IC 74S240	IN			PPP4	N	
17	A	15163600	4.00	PC	IC 74S08	IN			PPP4	N	
34	A	17184200	1.00	PC	INTEGRATED CIRCUIT TTL 74193	IN			PPP4	N	
69	C	17705905	1.00	PC	RES FXD .25W 51000 OHMS	IN			PPP4	N	
20	C	24500051	1.00	PC	RES FXD .25W 330 OHMS	IN			PPP4	N	
21	C	24500063	7.00	PC	RES FXD .25W 1000 OHMS	IN			PPP4	N	
22	C	24500080	2.00	PC	RES FXD .25W 5100 OHMS	IN			PPP4	N	
32	C	24500081	1.00	PC	RES FXD .25W 5600 OHMS	IN			PPP4	N	
23	C	24500084	1.00	PC	RES FXD .25W 7500 OHMS	IN			PPP4	N	
24	C	24500091	1.00	PC	RES FXD .25W 15000	IN			PPP4	N	
25	C	24504382	1.00	PC	CAP,FXD SOLID TANTALUM	IN			PPP4	N	
72	C	24563025	1.00	PC	RES FXD COMP 1/8W 330 OHMS	IN			PPP4	N	
73	C	24563026	1.00	PC	RES FXD COMP 1/8W 390 OHMS	IN			PPP4	N	
26	A	39397400	54.00	PC	SOCKET, MINIATURE SPRING	IN			PPP4	N	
27	A	51858100	3.00	PC	SOCKET,IC,PC TYPE 24 PIN	IN			PPP4	N	
28	A	51858101	3.00	PC	SOCKET,IC,PC TYPE 28 PIN	IN			PPP4	N	
71	A	66299099	1.00	PC	IC 7400 2-INPUT NAND	IN			PPP4	N	
29	A	75009911	2.00	PC	RESISTOR MODULE 150 OHMS 2 0/0	IN			PPP4	N	
30	A	84996701	1.00	PC	CAP,CER 100V 10 PF	IN			PPP4	N	
31	A	84996713	3.00	PC	CAP,CER 100V 100 PF	IN			PPP4	N	
33	A	84996717	1.00	PC	CAP,CER 100V 220 PF	IN			PPP4	N	

SCMD MF8 INFO

ASSEMBLY PARTS LIST

96890062		A	A	D	PW SUBASSY-MOD DRIVE ADAPTER	DS	GB145A	03/23/82		03/23/82	MF
ASSEMBLY NUMBER		REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORB. NUMBER	PROCESSING DATE	PAGE NUMBER
PART NUMBER	QTY	PART NUMBER	QTY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORB. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PH	PC
35	A	84996721	1.00	PC	CAP,CER 100V 470 PF	IN			PPP4	N	
36	A	84996730	1.00	PC	CAP,CER 100V 1200 PF	IN			PPP4	N	
37	A	84996740	1.00	PC	CAP,CER 100V 6800 PF	IN			PPP4	N	
38	A	84996743	21.00	PC	CAP,CER 100V .01 MF	IN			PPP4	N	
39	A	88812400	9.00	PC	RIVET-SEMI-TUBULAR,BRS .312 LG	IN			PPP4	N	
40	A	88880500	3.00	PC	CAP ELECT-ALUM 16VDC 100UF	IN			PPP4	N	
41	A	88881100	8.00	PC	IC 74151A TTL DATA SEL MUX	IN			PPP4	N	
42	A	88881300	2.00	PC	IC 74150 TTL 16-BIT SEL/MUX	IN			PPP4	N	
18	A	88883300	2.00	PC	IC 74S257 QUAD 2-L D SEL/MUX	IN			PPP4	N	
43	A	88883400	8.00	PC	IC 9309 TTL DUAL 4-INPUT MUX	IN			PPP4	N	
44	A	88883700	4.00	PC	IC 74S04 SCHOTTKY TTL HEX INV	IN			PPP4	N	
45	A	88884500	3.00	PC	IC 74S00 SCHOTTKY TTL QUAD 2-I	IN			PPP4	N	
46	A	88885100	4.00	PC	IC 74S138 TTL DECODER/MUX	IN			PPP4	N	
47	A	88885300	2.00	PC	IC 74S20 SCHOTTKY TTL DUAL 4-I	IN			PPP4	N	
48	A	88885400	10.00	PC	IC 9024 TTL DUAL FLIP/FLOP	IN			PPP4	N	
49	A	88885700	1.00	PC	IC 7486 TTL QUAD 2-IN EXCL OR	IN			PPP4	N	
50	A	88886100	2.00	PC	IC 7489 TTL 64 BIT RAM	IN			PPP4	N	
51	A	88886700	1.00	PC	IC 7475 TTL 4-BIT BISTAB LATCH	IN			PPP4	N	
52	A	88891600	4.00	PC	IC 74S85 TTL 4-BIT MAGN COMPAR	IN			PPP4	N	
70	A	88896100	1.00	PC	IC 7414 TTL HEX SCHMITT TRIGER	IN			PPP4	N	
54	C	88896600	1.00	PC	INSULATOR-CARD FRAME,UPPER	IN			PPP4	N	
55	C	88896700	1.00	PC	INSULATOR-CARD FRAME,LOWER	IN			PPP4	N	
56	C	88896800	1.00	PC	FRAME-CARD (CASTING)	IN			PPP4	N	
57	A	88897800	20.00	PC	CAP-FIXED SOLID TANT,6VDC,12UF	IN			PPP4	N	
58	A	88922800	2.00	PC	IC 93S62/82S62 TTL PAR/GEN/CHK	IN			PPP4	N	
59	A	88924500	1.00	PC	IC 7404 TTL HEX INVERTER	IN			PPP4	N	
60	A	88924706	1.00	PC	RES NETWORK-STP,8 PIN,1.K OHM	IN			PPP4	N	
61	A	89684100	18.00	PC	CONNECTOR PLUG TWO PIN JUMPER	IN			PPP4	N	
13	A	95965100	5.00	PC	IC LATCH 6BIT D TYPE74LS174	IN			PPP4	N	
68	D	96720452	1.00	PC	PWB-MODULE DRIVE ADAPTER	IN			PPP4	N	
62	A	96744154	3.00	PC	IC 7403 TTL QUAD 2-IN POS NAND	IN			PPP4	N	
63	A	96744157	1.00	PC	IC 74279 TTL S-R LATCH	IN			PPP4	N	
64	A	96744170	1.00	PC	IC 9314 TTL 4-BIT LATCH	IN			PPP4	N	
65	A	96744215	5.00	PC	IC 8832 TTL DUAL DIFF LINE DR	IN			PPP4	N	
66	A	96745400	3.00	PC	IC 9334 TTL 8-BIT ADDRES LATCH	IN			PPP4	N	
67	A	96745500	3.00	PC	IC 74S161 TTL 4-BIT BINARY CTR	IN			PPP4	N	

SCMD MF8 INFO

Figure 7-7. Module Drive Adapter Subassembly (96890062) (Sheet 3 of 4)

ASSEMBLY PARTS LIST

96890062		A	A	D	PW SUBASSY-MOD DRIVE ADAPTER		DS	GB145A	03/23/82		03/23/82	MF
ASSEMBLY NUMBER		REV	CL	SW	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	SW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/ID/UNIT	SW	SW	SW
53	A	96860402	1.00	PC	OSCILLATOR-HRD CLK, 20.2752 MHZ	IN			PPP4	N		
NUMBER OF LINE ITEMS = 73 HIGHEST FIND NUMBER = 73												

AA270-1 REV 1-80
 *CMD MFG INFO
 PRINTED IN U.S.A.

Figure 7-7. Module Drive Adapter Subassembly (96890062) (Sheet 4 of 4)

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
A	DS/9375			8/23/82		AW

CAUTION:
 THIS PWA CONTAINS ~~ELECTROSTATIC~~
 SENSITIVE DEVICES WHICH MAY BE
 PERMANENTLY DAMAGED BY IMPROPER
 HANDLING. OBSERVE HANDLING PROCEDURES
 OUTLINED IN CDC STD 160.010 & CDC ENGR
 SPEC 16013100 WHEN ASSEMBLING, INSTALLING,
 REMOVING OR TRANSPORTING THIS PWA.

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.	DWN	B. J. J. J.	7/1/82	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037	TITLE: PWA - 82 RFT MODULE DRIVE ADAPTER		
	CHKD	A. J. J.	8/24/82				
	ENG	AP. J. J.	8/1/82				
	MFG	J. J. J.	8-2-82				
	APP	A. J. J.	8-23-82				
				CODE IDENT	09132	DWG NO	96890090
				SCALE		88887264	

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132		96890090	A
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NOTES:

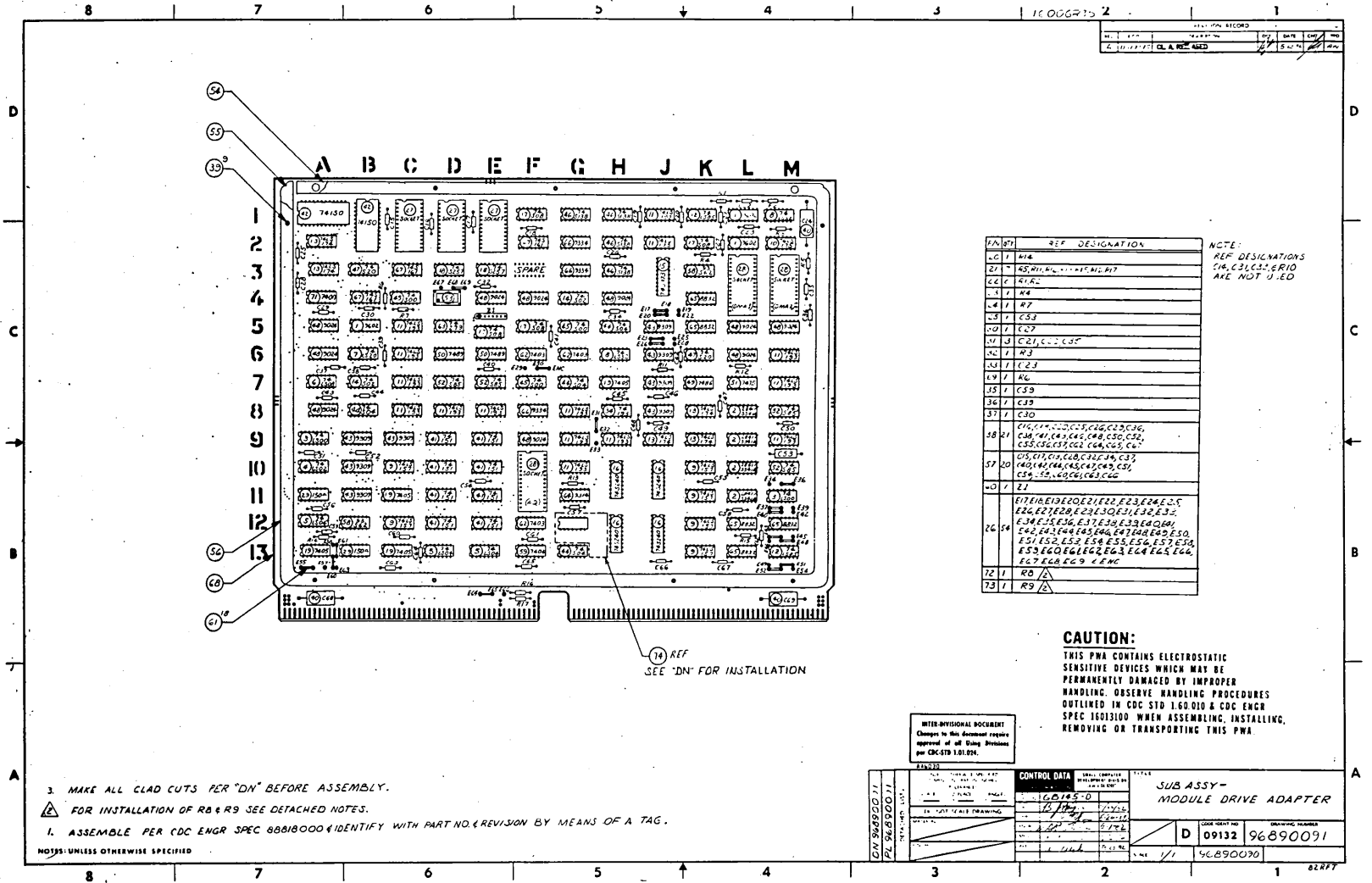
1. MARK PART NO. PER CDC SPEC 88818000.
2. **INSTALL F/W 3 PER TABLE BELOW:**
 (INSURE I.C. PIN 1 MATCHES SOCKET PIN 1)

ROM SET	
PART NO.	LOCATION
96755004	@ C1 (BITS 16-23)
96755005	@ E1 (BITS 08-15)
96755006	@ D1 (BITS 00-07)
3. **INSTALL FPLA'S PER TABLE BELOW:**
 (INSURE I.C. PIN 1 MATCHES SOCKET PIN 1)

FPLA	
PART NO.	LOCATION
96860504	@ F10 (AQ)
96860505	@ L3 (DMA1)
96860506	@ M3 (DMA2)

Figure 7-8.1. Module Drive Adapter PWA (96890090) (Sheet 1 of 2)

Figure 7-8.2. Module Drive Adapter Subassembly (96890091) (Sheet 1 of 7)



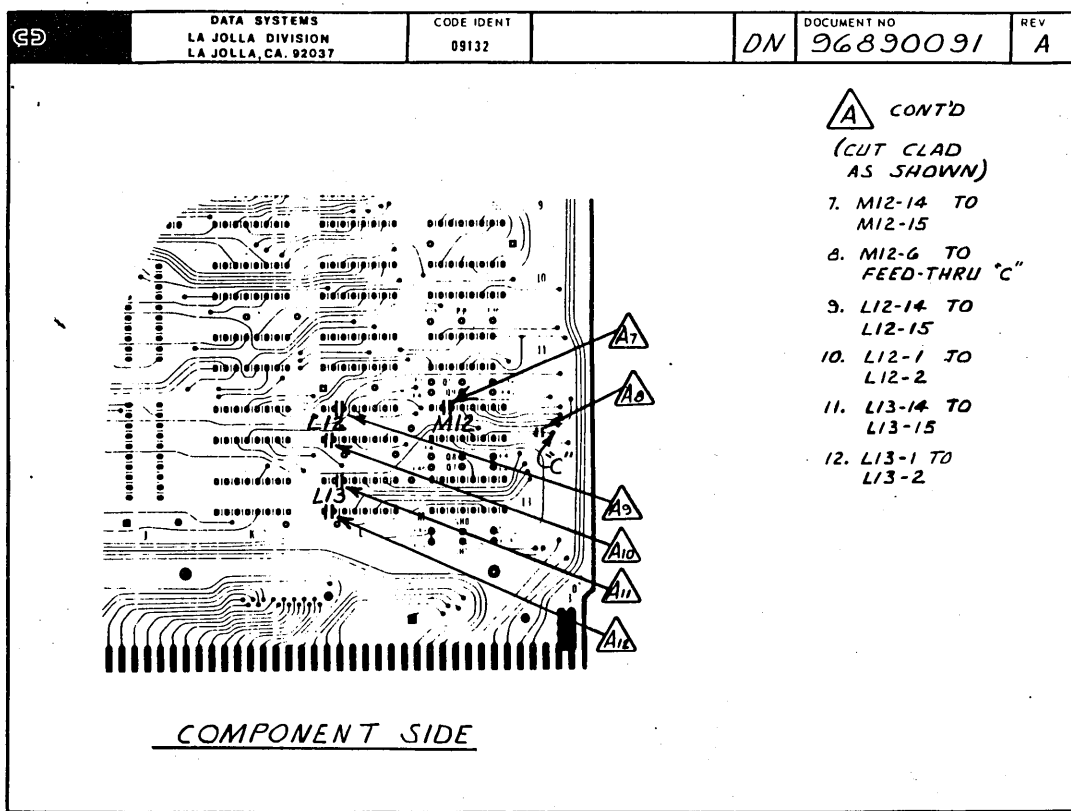
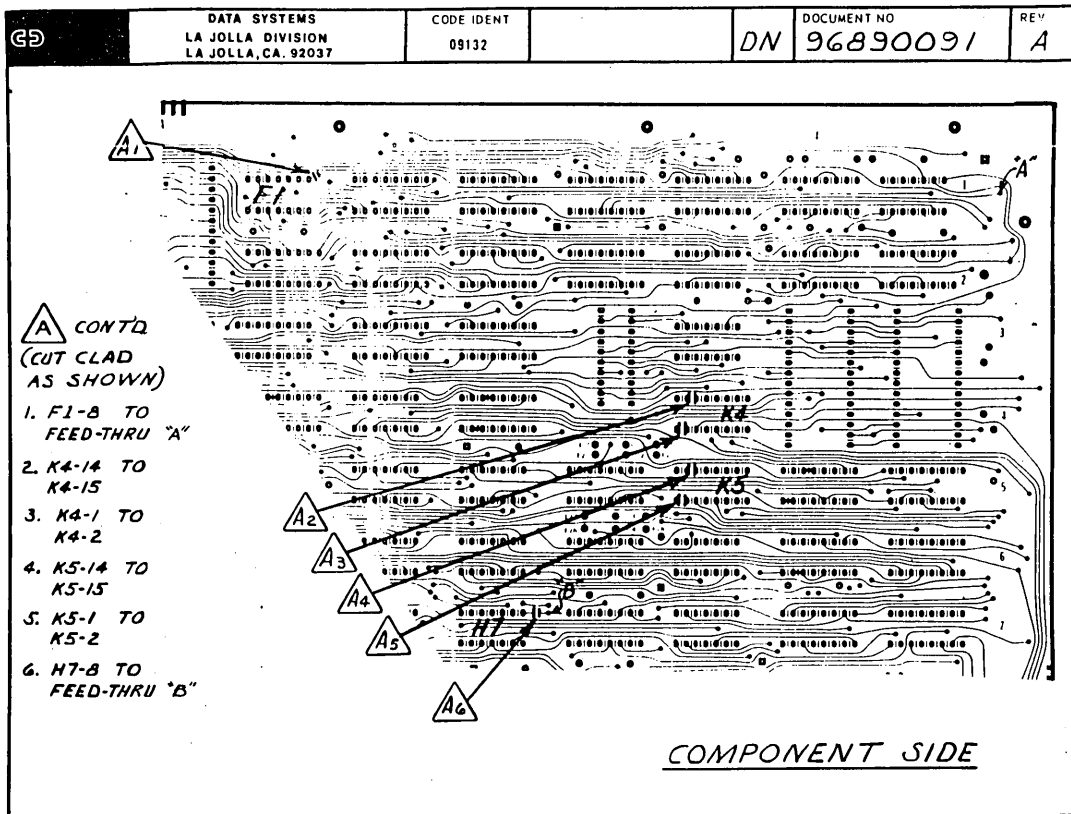
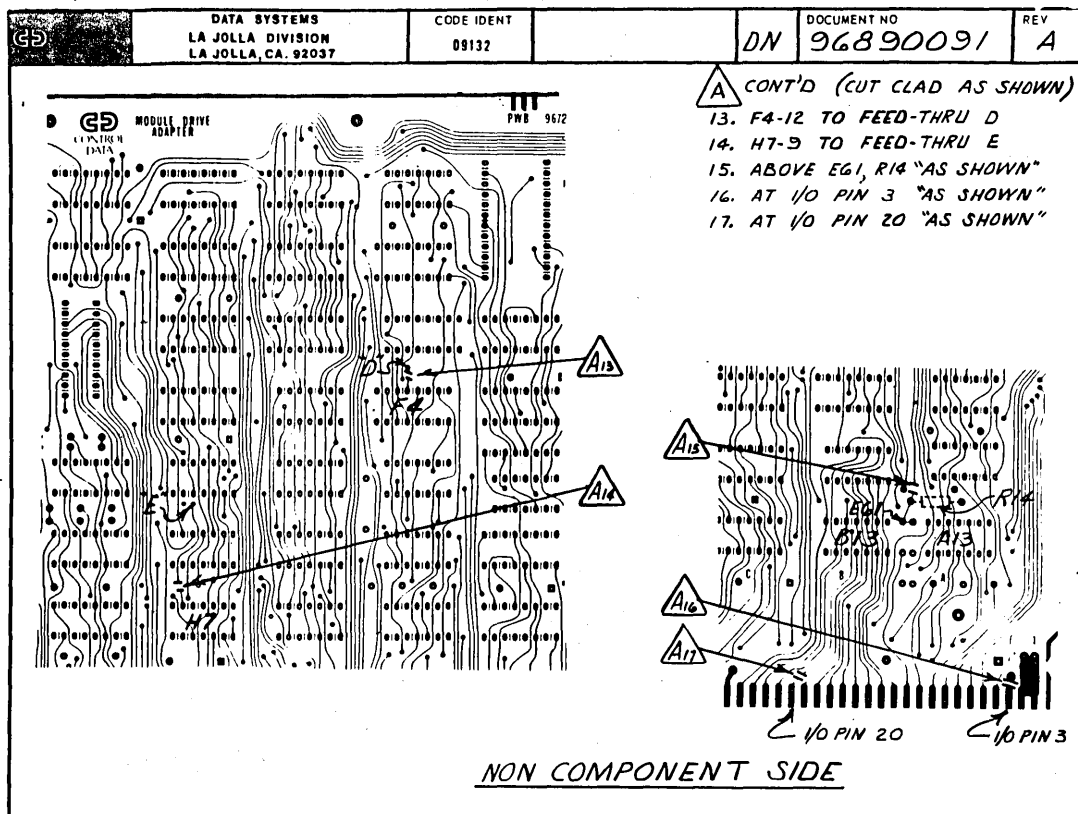


Figure 7-8.2. Module Drive Adapter Subassembly (96890091) (Sheet 3 of 7)



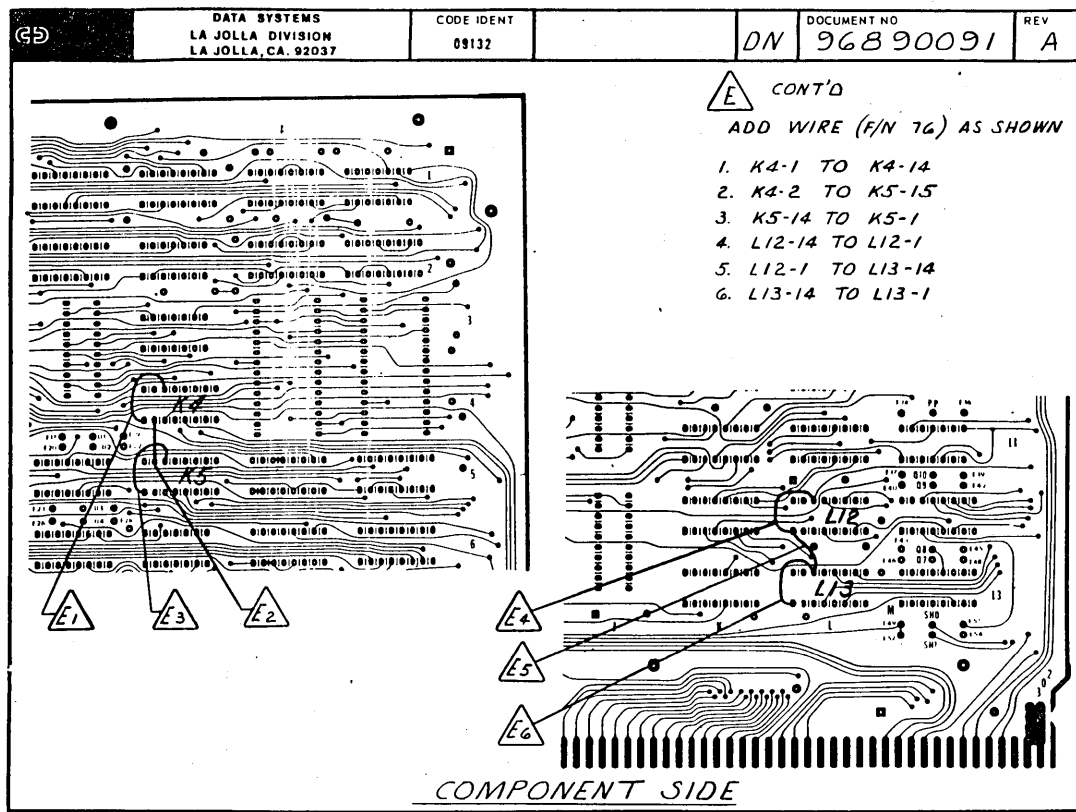
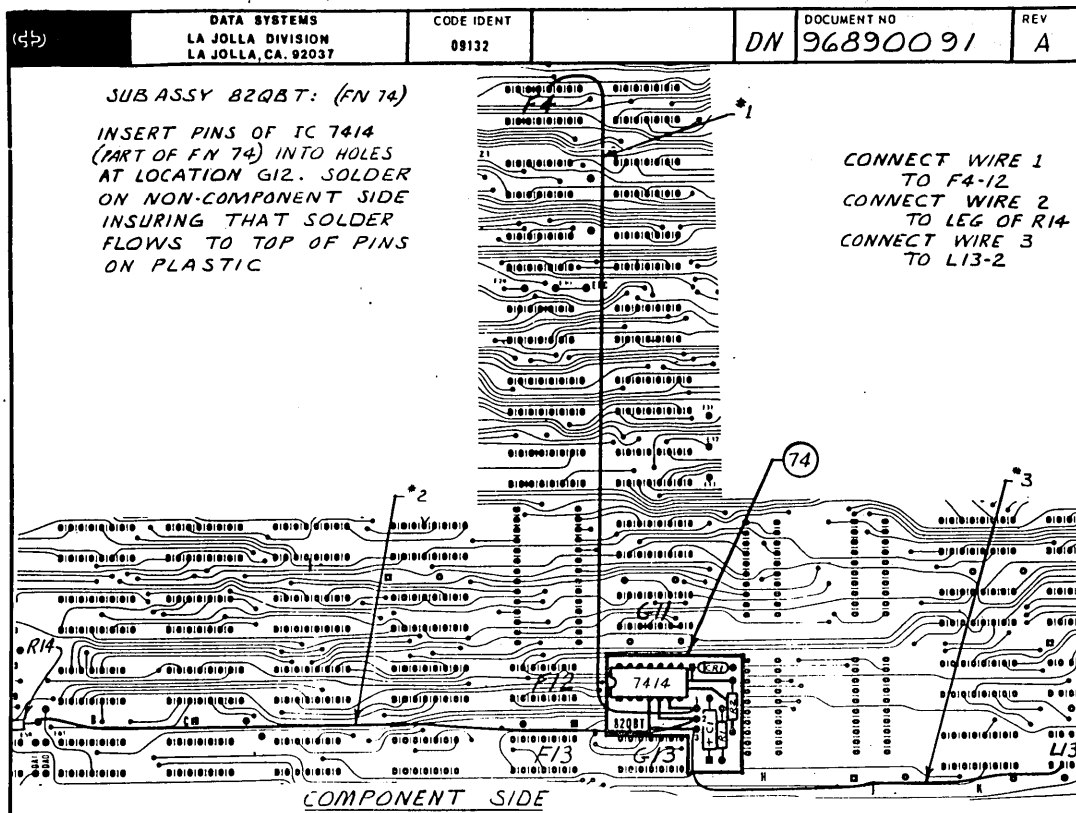
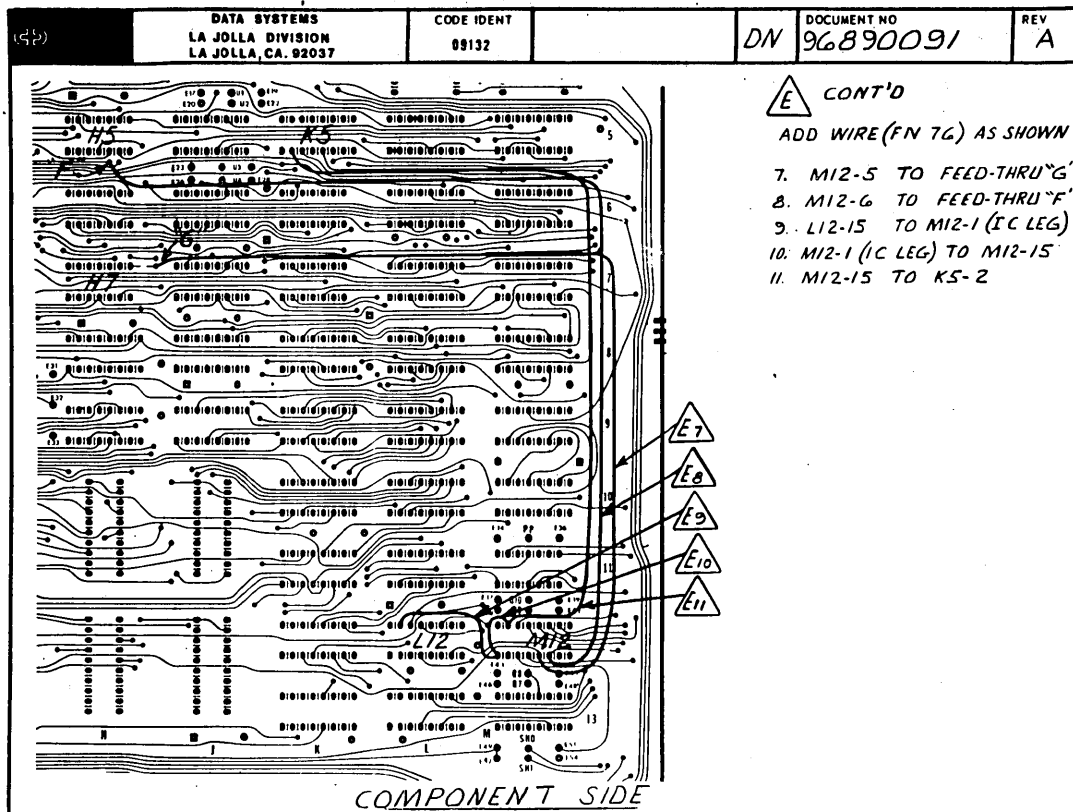


Figure 7-8.2. Module Drive Adapter Subassembly (96890091) (Sheet 5 of 7)



ASSEMBLY PARTS LIST

96890091		A	A	D	SUB ASSY MODULE DRIVE ADAPTER	DS	G6145D	08/13/82		08/13/82		MF
ASSEMBLY NUMBER	REV	DL	SE	ASSEMBLY DESCRIPTION			DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER
POOR NUMBER	REV	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NEW PART	REV	REV	REV
1	A	15104301	3	PC	IC 9602 MULTIVIB, DUAL RETRIG	IN			PPP4	N		
2	A	15126800	4	PC	IC REG, MOS 256-BIT 64X4 FIFO	IN			PPP4	N		
3	A	15144900	2	PC	IC TTL QUAD 2-IN NAND 74LS00	IN			PPP4	N		
4	A	15145000	1	PC	IC TTL QUAD 2-INPUT NOR 74LS02	IN			PPP4	N		
5	A	15145100	3	PC	IC TTL HEX INVERTER 74LS04	IN			PPP4	N		
6	A	15145400	1	PC	IC TTL QUAD 2INPUT AND 74LS08	IN			PPP4	N		
7	A	15145900	1	PC	IC TTL DUAL 4INPUT NAND 74LS20	IN			PPP4	N		
8	A	15146200	2	PC	IC TTL QUAD 2INPUT OR 74LS32	IN			PPP4	N		
9	A	15146700	6	PC	IC MULTI, TTL QUAD 2 74LS157	IN			PPP4	N		
10	A	15146900	1	PC	IC-TTL, LATCH 4 BIT 74LS175	IN			PPP4	N		
11	A	15147000	15	PC	IC COUNTER TTL 4-BIT 74LS193	IN			PPP4	N		
12	A	15147200	2	PC	IC-74LS85 TTL 4 BIT COMPARATOR	IN			PPP4	N		
14	A	15158500	2	PC	IC-TTL QUAD 2 INPUT NOR 74S02	IN			PPP4	N		
19	A	15161300	4	PC	I.C. TYPE 7405 TTL-HEX INVERT.	IN			PPP4	N		
15	A	15162800	1	PC	IC-OCTAL LATCH, TTL 74S373	IN			PPP4	N		
16	A	15163218	4	PC	IC 74S240	IN			PPP4	N		
17	A	15163600	4	PC	IC 74S08	IN			PPP4	N		
34	A	17184200	1	PC	INTEGRATED CIRCUIT TTL 74193	IN			PPP4	N		
69	C	17705905	1	PC	RES FXD .25W 51000 OHMS	IN			PPP4	N		
20	C	24500051	1	PC	RES FXD .25W 330 OHMS	IN			PPP4	N		
21	C	24500063	7	PC	RES FXD .25W 1000 OHMS	IN			PPP4	N		
22	C	24500080	2	PC	RES FXD .25W 5100 OHMS	IN			PPP4	N		
32	C	24500081	1	PC	RES FXD .25W 5600 OHMS	IN			PPP4	N		
23	C	24500084	1	PC	RES FXD .25W 7500 OHMS	IN			PPP4	N		
24	C	24500091	1	PC	RES FXD .25W 15000	IN			PPP4	N		
25	C	24504382	1	PC	CAP, FXD SOLID TANTALUM	IN			PPP4	N		
72	C	24563025	1	PC	RES FXD COMP 1/8W 330 OHMS	IN			PPP4	N		
73	C	24563026	1	PC	RES FXD COMP 1/8W 390 OHMS	IN			PPP4	N		
26	A	39397400	54	PC	SOCKET, MINIATURE SPRING	IN			PPP4	N		
27	A	51858100	3	PC	SOCKET, IC, PC TYPE 24 PIN	IN			PPP4	N		
28	A	51858101	3	PC	SOCKET, IC, PC TYPE 28 PIN	IN			PPP4	N		
76	C	52629949	30	IN	WIRE ELEC 30 GA WHITE	IN			PPP1	N		
75	A	62019900	0	UZ	EPOXY, 2 PART 5 MIN (CLEAR) TUBE	IN			RFE4	N		
71	A	66299099	1	PC	IC 7400 2-INPUT NAND	IN			PPP4	N		
29	A	75009911	2	PC	RESISTOR MODULE 150 OHMS 2 W/O	IN			PPP4	N		
30	A	84996701	1	PC	CAP, CER 100V 10 PF	IN			PPP4	N		

SCMD MFG INFO

Figure 7-8.2. Module Drive Adapter Subassembly (96890091) (Sheet 6 of 7)

ASSEMBLY PARTS LIST

96890091		A	A	D	SUB ASSY MODULE DRIVE ADAPTER	DS	68145D	08/13/82		08/13/82	MF			
ASSEMBLY NUMBER		REV	CL	SS	ASSEMBLY DESCRIPTION	ORDER PRICE	PART USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER			
FIND NUMBER	REV	SS	SS	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAN/OUT PART TYPE	REV	SS	SS
31	A			84996713	3.		PC CAP,CER 100V 100 PF	IN			PPP4	N		
33	A			84996717	1.		PC CAP,CER 100V 220 PF	IN			PPP4	N		
35	A			84996721	1.		PC CAP,CER 100V 470 PF	IN			PPP4	N		
36	A			84996730	1.		PC CAP,CER 100V 1200 PF	IN			PPP4	N		
37	A			84996740	1.		PC CAP,CER 100V 6800 PF	IN			PPP4	N		
38	A			84996743	21.		PC CAP,CER 100V .01 MF	IN			PPP4	N		
39	A			88812400	9.		PC RIVET-SEMI-TUBULAR,BRS .312 LG	IN			PPP4	N		
40	A			88880500	3.		PC CAP ELECT-ALUM 16VDC 100UF	IN			PPP4	N		
41	A			88881100	8.		PC IC 74151A TTL DATA SEL MUX	IN			PPP4	N		
42	A			88881300	2.		PC IC 74150 TTL 16-BIT SEL/MUX	IN			PPP4	N		
43	A			88883300	2.		PC IC 74S257 QUAD 2-L D SEL/MUX	IN			PPP4	N		
44	A			88883400	8.		PC IC 9309 TTL DUAL 4-INPUT MUX	IN			PPP4	N		
45	A			88883700	4.		PC IC 74S04 SCHOTTKY TTL HEX INV	IN			PPP4	N		
46	A			88884500	3.		PC IC 74S00 SCHOTTKY TTL QUAD 2-I	IN			PPP4	N		
47	A			88885100	4.		PC IC 74S138 TTL DECODER/MUX	IN			PPP4	N		
48	A			88885300	2.		PC IC 74S20 SCHOTTKY TTL DUAL 4-I	IN			PPP4	N		
49	A			88885400	10.		PC IC 9024 TTL DUAL FLIP/FLOP	IN			PPP4	N		
50	A			88885700	1.		PC IC 7446 TTL QUAD 2-IN EXCL OP.	IN			PPP4	N		
51	A			88886100	2.		PC IC 7489 TTL 64 BIT RAM	IN			PPP4	N		
52	A			88886700	1.		PC IC 7475 TTL 4-BIT HISTAR LATCH	IN			PPP4	N		
53	A			88891600	4.		PC IC 74S85 TTL 4-BIT MAGN COMPAR	IN			PPP4	N		
70	A			88896100	1.		PC IC 7414 TTL HEX SCHMITT TRIGER	IN			PPP4	N		
54	C			88896600	1.		PC INSULATOR-CARD FRAME,UPPER	IN			PPP4	N		
55	C			88896700	1.		PC INSULATOR-CARD FRAME,LOWER	IN			PPP4	N		
56	C			88896800	1.		PC FRAME-CARD (CASTING)	IN			PPP4	N		
57	A			88897800	20.		PC CAP-FIXED SOLID TANT,6VDC,120UF	IN			PPP4	N		
58	A			88922800	2.		PC IC 93S62/82S62 TTL PAR/GEN/CHK	IN			PPP4	N		
59	A			88924500	1.		PC IC 7404 TTL HEX INVERTER	IN			PPP4	N		
60	A			88924706	1.		PC RES NETWORK-SIP,R PIN,1.0 OHM	IN			PPP4	N		
61	A			89684100	18.		PC CONNECTOR PLUG TWO PIN JUMPER	IN			PPP4	N		
63	D			95965100	5.		PC IC LATCH 6BIT 0 TYPE74LS174	IN			PPP4	N		
64	D			96720452	1.		PC PWB-MODULE DRIVE ADAPTER	IN			PPP4	N		
62	A			96744154	3.		PC IC 7403 TTL QUAD 2-IN POS NAND	IN			PPP4	N		
63	A			96744157	1.		PC IC 74279 TTL S-R LATCH	IN			PPP4	N		
64	A			96744170	1.		PC IC 9314 TTL 4-BIT LATCH	IN			PPP4	N		
65	A			96744215	5.		PC IC 6832 TTL DUAL DIFF LINE DR	IN			PPP4	N		

SCMD MFG INFO

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ASSEMBLY PARTS LIST

96890091				A	A	D	SUB ASSY MODULE DRIVE ADAPTER			DS	68145D	08/13/82		08/13/82		MF
ASSEMBLY NUMBER				REV	CL	REV	ASSEMBLY DESCRIPTION			ORDER PRICE	PART USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	
FIND NUMBER	REV	PART NUMBER		QUANTITY		UNIT MEAS.	PART DESCRIPTION			IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAN/OUT PART TYPE		REV	SS
66	A	96745400		3.			PC	IC 9334 TTL 8-BIT ADDRESS LATCH			IN			PPP4	N	
67	A	96745500		3.			PC	IC 74S161 TTL 4-BIT BINARY CTR			IN			PPP4	N	
53	A	96860402		1.			PC	OSCILLATOR-HRD CLK,20.2752 MHZ			IN			PPP4	N	
74	B	96890078		1.			PC	PWB ASSY 68145 MOD 820BT			IN					
NUMBER OF LINE ITEMS = 76																
HIGHEST FIND NUMBER = 76																

SCMD MFG INFO

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Figure 7-8.2. Module Drive Adapter Subassembly (96890091) (Sheet 7 of 7)

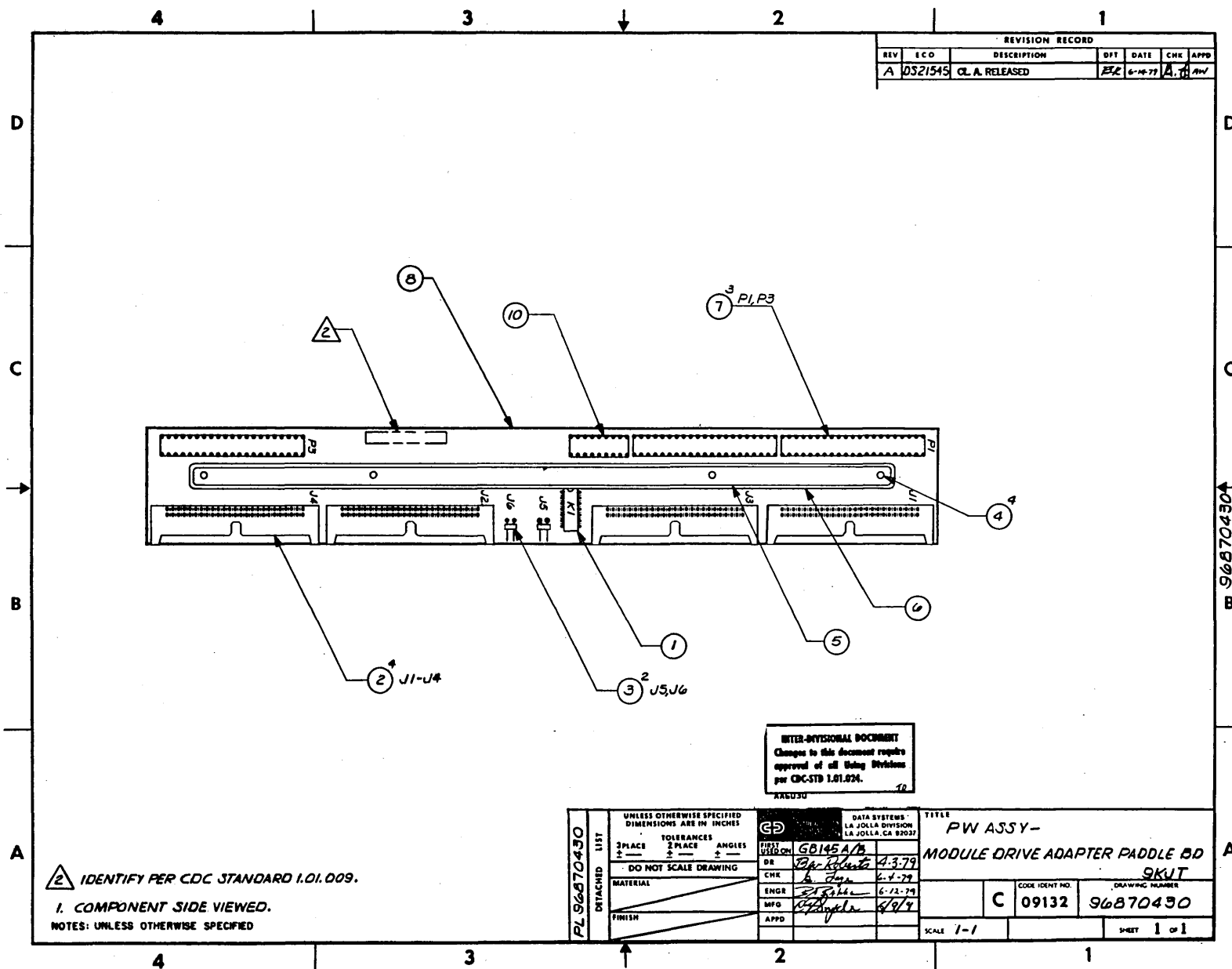


Figure 7-9. PWA - Module Drive Adapter Paddle Board (Sheet 1 of 2)

DWN	4.5.79	CD	TITLE	PWA ASSY-MODULE	PREFIX	DOCUMENT NO.	REV.
CHKD	4.5.79	CD	DRIVE ADAPTER PADDLE BD	PL	96870430	A	
ENG	4.5.79	CD	FIRST USED ON	GB145 A/B	SHEET 1 OF 2		
APP	4.5.79	CD	CODE IDENT	09132			

SHEET REVISION STATUS				REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	DS21545	CL. A. RELEASED	BR	6-18-79	Y. J.	AN	

NOTES:

DETACHED LISTS

AA2106 REV. 8/71

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ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

SH 2

ASSEMBLY NUMBER	REV	CLASS	BY	DATE	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER
96870430	A	CLA	C		PWA-MODULE DRIVE ADAPTER 9KJT	DS	SMD	06/06/79	06/06/79	1

FIND NUMBER	QTY	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	QTY	QTY
1	A	39399000	100	PC	RELAY,SPDT DRY REED DUAL-LINE	IN			PPP4	N	
2	A	39903606	400	PC	CONN,HEADER,RIGHT ANGLE (2X25)	IN			PPP4	N	
4	A	88812400	400	PC	RIVET-SEMI-TUBULAR,RRS .312 LG	IN			PPP4	N	
5	D	88895400	100	PC	STIFFENER-PC BOARD (CASTING)	IN			PPP4	N	
6	C	88895500	100	PC	INSULATOR-CARD STIFFENER	IN			PPP4	N	
10	A	96751917	100	PC	CONNECTOR-PWR .125 CTR 18 POS	IN			PPP4	N	
3	A	96752034	200	PC	CONN,HEADER-RT ANG(LOW- 2 POS)	IN			AYV4	N	
7	A	96756761	300	PC	CONNECTOR-PWR .125 CENTERS	IN			PPP4	N	
8	C	96870230	100	PC	PWR-MODULE DRIVE ADAPTER	IN				N	
9	C	96870630	REF	PC	LOGIC DIAG-MOD DRV ADPTR 9KJT	IN				N	

NUMBER OF LINE ITEMS = 10
HIGHEST FIND NUMBER = 10

AA 2708 1 REV 7/76

PROJECT ENGINEER

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Figure 7-9. PWA - Module Drive Adapter Paddle Board (Sheet 2 of 2)

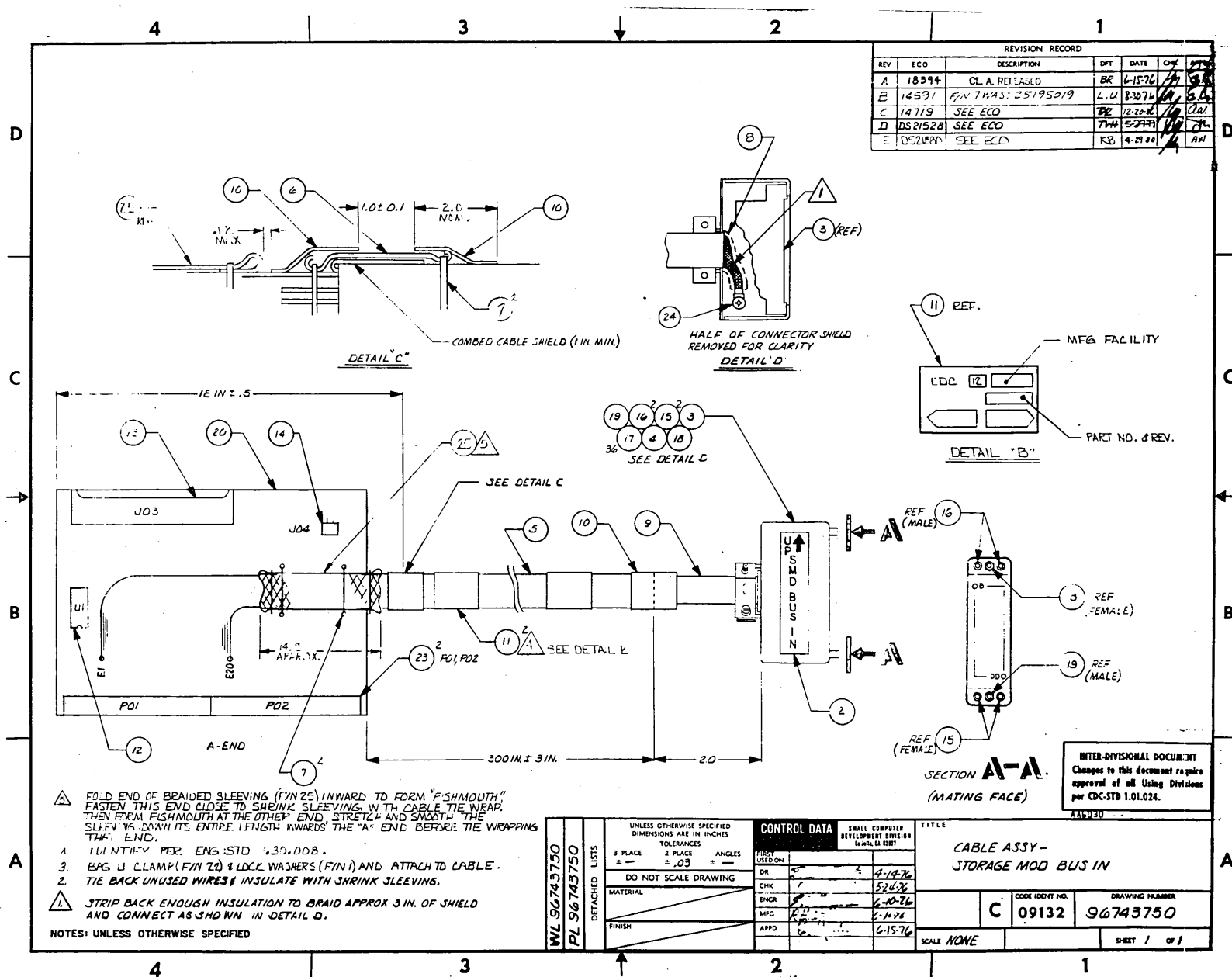


Figure 7-10. Cable Assembly - Module Drive Bus In (Sheet 1 of 4)

DWN	B. B. B. 4-14-76	CONTROL DATA	TITLE	CABLE ASSY- STORAGE MOD BUS IN	PREFIX	DOCUMENT NO	REV
CHKD	G. G. G. 5-24-76				PL	96743750	E
ENG	E. E. E. 6-14-76	SMALL COMPUTER	FIRST USED ON				
MFG	E. E. E. 6-14-76	DEVELOPMENT DIVISION					
APPR	E. E. E. 6-14-76	CODE IDENT				SHEET 1 OF 2	
			09132				

SHEET REVISION STATUS				REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	APP		
A	18394	CL A. RELEASED	MBR	6-15-76	E. E. E.		
B	14591	F/N WAS: 25195019	L. J.	8-30-76	E. E. E.		
C	14719	SEE ECO	MBR	10-2-76	Q. W.		
D	DS21528	F/N 14 WAS 75743702	T. W.	5-29-77	Q. W.		
E	DS21880	SEE ECO	KB	4-29-80	AWJ		

INTER-DIVISIONAL DOCUMENT
Changes to this document require
approval of all Using Divisions
per CDC-STD 1.01.024

NOTES:

DETACHED LISTS

AA3180 REV. 8/71

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 CONTROL DATA
CORPORATION

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE
PARTS

96743750	E	CLA	C	CABLE ASSY-STORAGE MOD BUS IN	DSM	MP17	05/19/76	04/19/80	1LE	MF
ASSEMBLY NUMBER	REV	CLASS	QTY	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST DRAFT	RELEASE DATE	PROCESSING DATE	PAGE NUMBER	
1	A	10125607	200	PC PLAIN WASHER NO. 10	OUT	014719	111976	PPP1	N	
2	A	10125806	200	PC SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1	N	
3	C	24501801	300	IN WIRE ELECT SOLID COPPER 22 GA	OUT	014719	111976	PPP1	N	
3	C	24502303	100	PC CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	24502801	100	PC SHIELD ELECT CONN 50 PIN	OUT	014719	111976	PPP4	N	
5	C	24518001	31000	IN CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
8	C	24534710	300	IN SHRINK SLEEVE 3/8 BLK BULK	IN	021880	041780	PPP4	N	
9	C	24534712	300	IN SHRINK SLEEVE 1/2 BLK BULK	IN	021880	041780	PPP3	N	
10	C	24534714	600	IN SHRINK SLEEVE 3/4 BLK BULK	IN	021880	041780	PPP1	N	
6	C	24534811	300	IN SHIELD ELECT BRAIDED-BULK	IN			PPP4	N	
7	C	25195019	600	IN WIRE TEE INSUL 22AWG WHITE	OUT	014591	081776	PPP3	N	
8	A	25196920	300	IN INSUL SLEEVE SHRINK 3/8 BLACK	OUT	014719	111976	PPP3	N	
9	A	25196921	300	IN INSUL SLEEVE SHRINK 1/2 BLACK	OUT	021880	041780	PPP3	N	
10	A	25196922	300	IN INSUL SLEEVE SHRINK 3/4 BLACK	OUT	021880	041780	PPP3	N	
2	B	39183344	100	PC LABEL, CONN BLOCK	IN	014719	111976	PPP4	N	
11	B	39296400	200	PC LABEL, CABLE MARKING	IN			PPP4	N	
4	B	39348900	100	PC SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4	N	
12	A	39399000	100	PC RELAY,SPDT DRY REED DUAL-LINE	IN			PPP4	N	
13	A	39903606	100	PC CONN,HEADER,RIGHT ANGLE (2X25)	IN			PPP4	N	
14	C	75743702	100	PC HEADER,RIGHT ANGLE (2 PIN)	OUT	021528	052279	PPE4	N	
15	D	93643004	200	PC GUIDE PIN CORNER	OUT	014719	111976	PPP4	N	
16	D	93643005	200	PC GUIDE SOCKET CORNER	OUT	014719	111976	PPP4	N	
17	B	93645003	3600	PC CONTACT SOCKET SERIES .062	IN			PPP4	N	
7	C	94277400	600	PC STRAP CABLE TIE	IN	021880	041780	PPP4	N	
15	C	94288100	200	PC PIN ASSY,CORNER GUIDE-FEMALE	IN	014719	111976	PPP4	N	
16	C	94288101	200	PC PIN ASSY,CORNER GUIDE-MALE	IN	014719	111976	PPP4	N	
18	B	94780401	100	PC SCREW-JACK-FEMALE	IN			PPP4	N	
19	B	94780402	100	PC SCREW-JACK-MALE	IN			PPP4	N	
25	A	95048801	1500	IN SLEEVING-BRAIDED 1/2 IN	IN	021880	041780	PPP3	N	
20	C	96743749	100	PC PWB-STORAGE MOD BUS IN	IN			PPP4	N	
21	C	96743751	REF	PC LOGIC DIAG-STORAGE MOD BUS IN	IN			RFE4	N	
14	A	96752034	100	PC CONN,HEADER-RT ANG(LOW- 2 POS)	IN	021528	052279	PYM4	N	
24	A	96753526	100	PC TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4	N	
23	A	96756701	200	PC CONNECTOR-PWB .125 CENTERS	IN			PPP4	N	
22	A	96785700	100	PC CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	
				NUMBER OF LINE ITEMS =	35					

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INTERDIVISIONAL DOCUMENT

AA 2708-1 REV. 7/75

Figure 7-10. Cable Assembly - Module Drive Bus In (Sheet 2 of 4)

AA3160 REV. 8/79

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AA2100 REV. 8/71

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60475800 C

CONTROL DATA					SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca. 92037		CODE IDENT D9132	SHEET 3	WL	DOCUMENT NO. 96743750	REV. C
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
21	5	24	95		AEND	E12		B END	K	17	BUS IN 3
22	↑	↑	9		↑ GND	E32		↑	M	↑	
23			96			E14			R		BUS IN 6
24			9		GND	E34			T		
25			97			E15			U		BUS IN 7
26			9		GND	E35			W		
27			98			E16			A		SELECT ACT.
28			9		GND	E36			C		
29			900			E17			V		BUS IN P
30			9		GND	E37			X		
31			910			E18			P		BUS IN 5
32			9		GND	E38			S		
33			920			E19			L		BUS IN 4
34			9		GND	E39			N		
35	↓	↓	930		↓	E20		↓	Z	↓	SYNC IN
36	5	24	9		AEND GND	E40		B END	b	17	

AAS100 REV. 6/71

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Figure 7-10. Cable Assembly - Module Drive Bus In (Sheet 4 of 4)



[illegible]

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

SH 2
MF

96743753		F	CLA	C	CARLE ASSY STORAGE MOD BUS OUT	US	MP17	05/19/76	05/22/79	1-1
ASSEMBLY NUMBER	REV	CLASS	DW	SIZE	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER
FIND NUMBER	DW	PART	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT	CHANGE ORD.	DATE	MAKE/OUT	PH
1	A	10125607	200	PC	PLAIN WASHER NO. 10	OUT	014719	111976	PPP1	N
1	A	10125606	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1	N
2	C	24501401	200	IN	WIRE ELECT SOLID COPPER 22 GA	OUT	014719	111976	PPP1	N
3	C	24502303	100	PC	CONN RECP ELFC 50 PIN	IN			PPP4	N
4	C	24502801	100	PC	SHIELD ELECT CONN 50 PIN	OUT	014719	111976	PPP4	N
5	C	24518001	30000	IN	CARLE ELEC 24 TWISTED PA	IN			PPP4	N
6	C	24534811	300	IN	SHIELD ELECT HPAIDED-HULK	IN			PPP4	N
7	A	25106920	200	IN	INSUL SLEEVE SHRINK 3/4 BLACK	OUT	014719	111976	PPP3	N
8	A	25196921	300	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN			PPP3	N
9	A	25196922	300	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN			PPP3	N
2	B	39183345	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4	N
10	R	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4	N
4	R	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4	N
11	A	39903606	100	PC	CONN, HEADER, RIGHT ANGLE (2X25)	IN			PPP4	N
12	D	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N
13	D	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N
14	R	93645003	4000	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N
21	C	94277400	200	PC	STRAP CARLE TIE	IN	014719	111976	PPP3	N
12	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4	N
13	C	94288101	200	PC	PIN ASSY-CORNER GUIDE	IN	014719	111976	PPP4	N
15	R	94780401	100	PC	SCREWS,JACK	IN			PPP4	N
16	R	94780402	100	PC	SCREWS,JACK	IN			PPP4	N
17	C	96743752	100	PC	PWB-STORAGE MOD BUS OUT	IN			PPP4	N
18	C	96743754	REF	PC	LOGIC DIAG-STORAGE MOD BUS OUT	IN			RFE4	N
22	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4	N
20	A	96756701	100	PC	CONNECTOR-PWB .125 CENTERS	IN			PPP4	N
19	A	96785700	100	PC	CLAMP U-TYPE .75 GAP	IN			PPP4	N

NUMBER OF LINE ITEMS = 27

HIGHEST FIND NUMBER = 22

NUMBER OF LINE ITEMS = 27
HIGHEST FIND NUMBER = 22

AA 2709-1 REV. 7-75

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INTERDIVISIONAL DOCUMENT

Figure 7-11. Cable Assembly - Module Drive Bus Out (Sheet 2 of 4)

DWN		CONTROL DATA	TITLE	WIRE LIST - CABLE ASSY STORAGE MOD BUS OUT	PREFIX	DOCUMENT NO.	REV
CHKD		6-15-76			WL	96743753	E
ENG		6-18-76	FIRST USED ON	CYBER 18-20		SHEET 1 OF 3	
MFG		6-18-76					
APPR		6-15-76					
		SMALL COMPUTER DEVELOPMENT DIVISION					
		CODE IDENT					
		09132					

SHEET REVISION STATUS										REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	APP'D								
A	18394	CL A. RELEASED	BR	6-15-76	EL								
B	14591	SBE ECO	L.U.										
C	14719	SEE ECO	BR	12-20-76	Q.W.								

NOTES:

INTER-DIVISIONAL DOCUMENT

Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.

DETACHED LISTS

AA2100 REV. 8/71

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CONDUCTOR IDENT.		FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
1	5	24	0			A END	E1		B END	h	14	TAG BUS 3
2	▲	▲	9			▲ GND	E21		▲	k	▲	TW PR TYP
3			2				E2			d		TAG BUS 2
4			9			GND	E22			f		
5			4				E3			c		TAG BUS 1
6			9			GND	E23			e		
7			5				E4			Z		TAG BUS 0
8			9			GND	E24			b		
9			6				E5			Y		BUS OUT P
10			9			GND	E25			a		
11			90				E6			u		RECYCLE
12			9			GND	E26			w		
13			91				E7			j		TAG BUS P
14			9			GND	E27			m		
15			92				E8			p		SYNC OUT
16			9			GND	E28			s		
17			93				E9			P		BUS OUT 4
18			9			GND	E29			S		
19	▼	▼	94			▼	E10		▼	U	▼	BUS OUT 6
20	5	24	9			A-END GND	E30		B END	W	14	

Figure 7-11. Cable Assembly - Module Drive Bus Out (Sheet 3 of 4)

CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca 92037			CODE IDENT 09132		SHEET 3		WL	DOCUMENT NO. 96743753		REV. C
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS	
21	5	24	95		AEND	E11		B END	V	14	BUS OUT 7	
22	↑	↑	9		↑ GND	E31		↑	X	↑		
23			96			E12			R		BUS OUT 5	
24			9		GND	E32			T			
25			97			E13			u		TAG OUT	
26			9		GND	E33			r			
27			98			E15			t		RESPONSE	
28			9		GND	E35			v			
29			900			E17			A		SEL HOLD 0	
30			9		GND	E37			C			
31			910			E18			B		SEL HOLD 1	
32			9		GND	E39			D			
33			920			E14			K		BUS OUT 2	
34			9		GND	E34			M			
35			930			E16			E		BUS OUT 0	
36			9		GND	E36			H			
37			940			E18			F		BUS OUT 1	
38			9		GND	E38			J			
39	↓	↓	950		↓	E20		↓	L	↓	BUS OUT 3	
40	5	24	9		AEND GND	E40		B END	N	16		

443168 REV. 9/71

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Figure 7-11. Cable Assembly - Module Drive Bus Out (Sheet 4 of 4)

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	DS21545	CL A RELEASED	JSH	6-15-79	1/4	AW	
B	DS21773	SEE ECO	KB	10-24-79	1/4	AW	

6. INSTALL ADDITIONAL CRIMPED CONTACTS F/N 19 IN ALL UNUSED CAVITIES OF CONNECTOR F/N 17.
 5. FOLD END OF BRAIDED SLEEVING (F/N 23) INWARD TO FORM "FISHMOUTH". FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE WRAP. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
 4. MARK CABLE LABEL (F/N 21) WITH PART NO. AND REVISION PER CDC STD 1.30.008.
 3. BAG U-CLAMP (F/N 16) & LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.
 2. AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER AND SLEEVE WITH 1 IN. F/N 22 AND CONNECT WITH ADDED WIRE (F/N 24) TO PIN B2.
 1. AT "B" END, STRIP BACK ENOUGH INSULATION TO BRAID APPROX. 2.5 IN. OF SHIELD; THEN SLEEVE WITH 2.25 IN. F/N 26 AND CONNECT AS SHOWN. ALSO, FOLD ALL UNUSED WIRES TOGETHER IN HALF AND SLEEVE WITH 1 IN. F/N 22.

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.		DWN JHUMPHREYS 4-23-79 CHKD [Signature] 6-9-79 ENG [Signature] 6-5-79 MFG [Signature] 4-5-79 APP [Signature] 6-5-79	TITLE CABLE ASSY - MODULE DRIVE BUS IN DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037	CODE IDENT 09132 DWG No. A 96720677	SCALE SHEET 1 OF 7
--	--	---	---	--	-----------------------

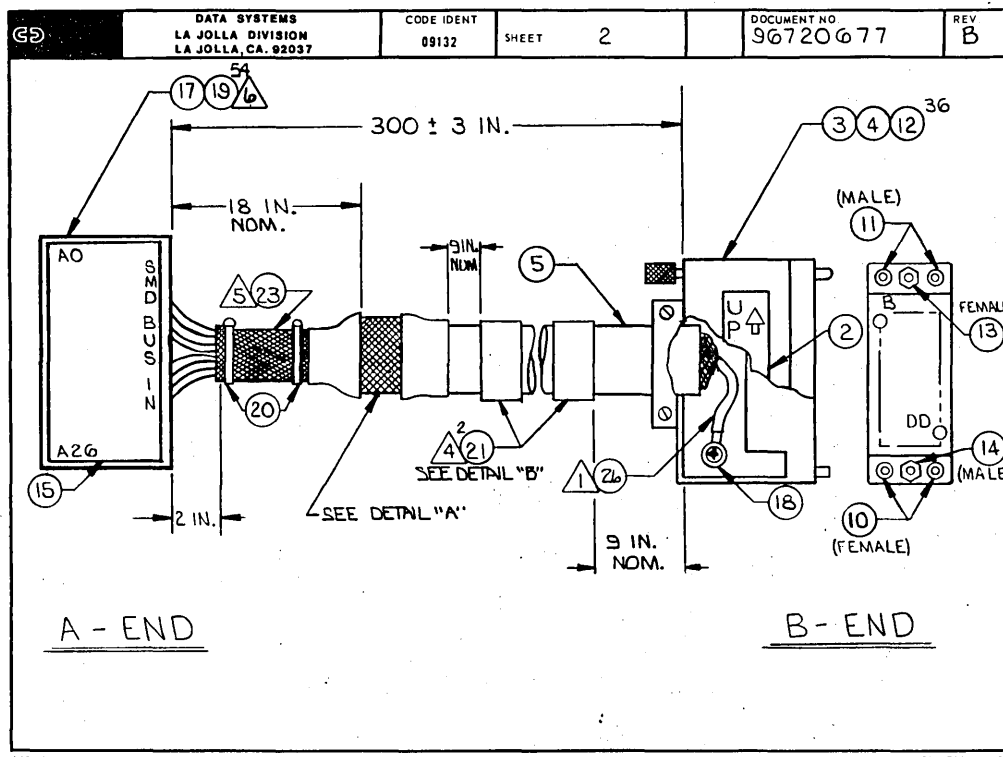
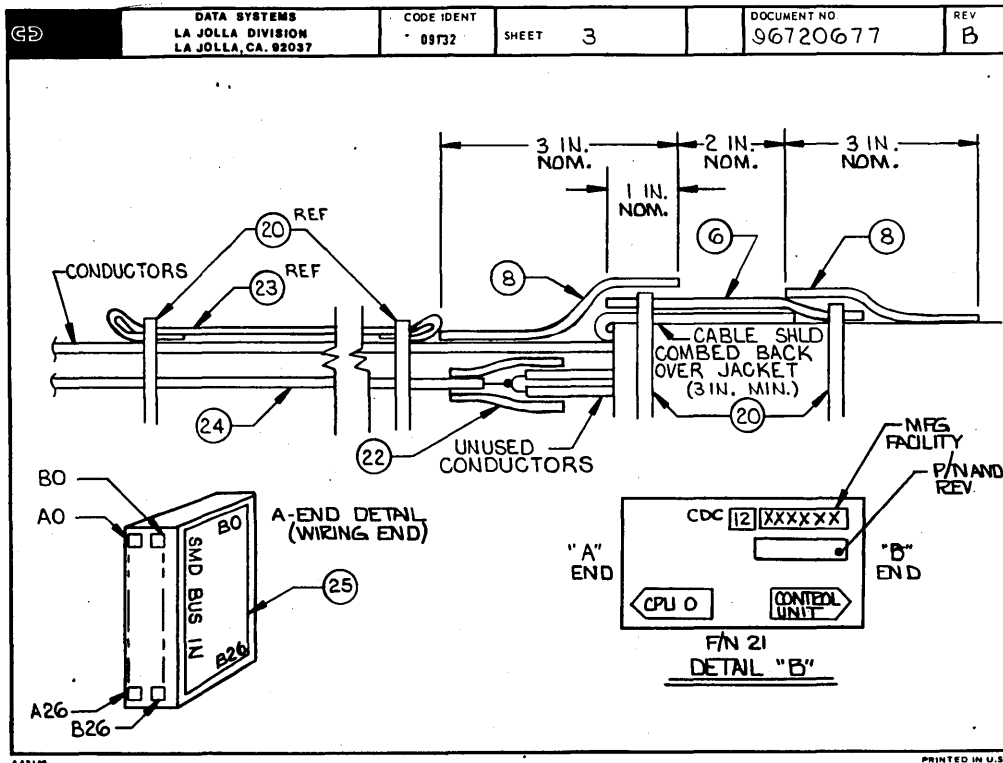


Figure 7-12. Cable Assembly - Module Drive Bus In (Sheet 1 of 4)



DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037					CODE IDENT 09132		SHEET 4		WL 96720677		REV. A	
CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS	
1	5	24	0		A	END	A 4	19	B	END	Y 12	TAG VALID } TW PR
2			9			GND	B 4			a		} TYP
3			2				A 5			d		CHECK END
4			9			GND	B 5			f		
5			4				A 6			t		INDEX
6			9			GND	B 6			v		
7			5				A 7			c		NORMAL END
8			9			GND	B 7			e		
9			6				A 8			u		SECTOR
10			9			GND	B 8			w		
11			90				A 9			h		ALERT 0
12			9			GND	B 9			k		
13			91				A 10			J		ALERT 1
14			9			GND	B 10			m		
15			92				A 12			F		BUS IN 2
16			9			GND	B 12			J		
17			93				A 13			B		BUS IN 0
18			9			GND	B 13			D		
19			94				A 14			E		BUS IN 1
20	5	24	9		A	END GND	B 14	19	B	END	H 12	

LA3182 REV. 8-71

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Figure 7-12. Cable Assembly - Module Drive Bus In (Sheet 2 of 4)

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

96720677	B	CLA	A	CABLE ASSY-MODULE DRIVE BUS IN	DS	10445	06/06/79	10/22/79	-17-1
ASSEMBLY NUMBER	REV	CLASS	DW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

Sheet 7
MF

FIND NUMBER	DW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	SPARE CODE	N
1	A	10125806	200	PC	PC SPRING LOCK WASHERS (MED.)	IN			PPP1	N	
3	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
5	C	24518001	30300	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
26	C	24528617	200	IN	INS SLEEVING, ELEC-BULK	IN	021773	102279	PPP3	N	
22	C	24534710	200	IN	SHRINK SLEEVE 3/8 BLK BULK	IN	021773	102279	PPP4	N	
8	C	24534714	600	IN	SHRINK SLEEVE 3/4 BLK BULK	IN	021773	102279	PPP1	N	
6	C	24534811	500	IN	SHIELD ELEC BRAIDED-BULK	IN			PPP4	N	
24	C	24548301	1000	IN	WIRE/ELECT, 24 GA, PVC, UL, BLK	IN			PPP1	N	
22	A	25106020	1000	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	021773	102279	PPP3	N	
8	A	25196520	1000	IN	INSUL SLEEVE SHRINK 3/4 BLACK	OUT	021773	102279	PPP3	N	
2	B	39183344	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
15	B	39183375	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
25	B	39183376	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
21	B	39296400	200	PC	LABEL, CABLE MARKING	IN	021773	102279	PPP4	N	
4	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
17	A	39906904	100	PC	CONN, HOUSING- .100C.C. 54 CAV	IN			PPP4	N	
12	B	93645003	3000	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
19	C	94245601	5400	PC	CONTACT-CRIMP INSERT SOCKET	IN	021773	102279	PPP4	N	
10	C	94245600	3000	PC	CONTACT-CRIMP INSERT SOCKET	OUT	021773	102279	PPP4	N	
20	C	94277400	400	PC	STRAP CABLE TIE	IN			PPP4	N	
21	C	94277400	100	PC	STRAP CABLE TIE	OUT	021773	102279	PPP4	N	
10	C	94288100	200	PC	PIN ASSY, CORNER GUIDE-FEMALE	IN			PPP4	N	
11	C	94288101	200	PC	PIN ASSY, CORNER GUIDE-MALE	IN			PPP4	N	
13	B	94780401	100	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
14	B	94780402	100	PC	SCREW-JACK-MALE	IN			PPP4	N	
23	A	95048801	1000	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
18	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
16	A	96785700	100	PC	CLAMP, U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 28
HIGHEST FIND NUMBER = 26

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AA 2708-1 REV 7-75

Figure 7-12. Cable Assembly - Module Drive Bus In (Sheet 4 of 4)

TABULATION			REVISION RECORD						
PART NO.	LG/IN	TOL. ±	REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
96870930	300	10	A	DS/9381	CL A RELEASED	J.V.W	7-30-92	JH	NW

NOTES:

1. AT "B" END, STRIP BACK ENOUGH INSULATION TO BRAID APPROXIMATELY 2.5 IN. OF SHIELD; THEN SLEEVE WITH 2.25 IN. (F/N 4) AND CONNECT AS SHOWN. ALSO, FOLD ALL UNUSED WIRES TOGETHER IN HALF AND SLEEVE WITH 1 IN. (F/N 5).
2. AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER AND SLEEVE WITH 1 IN. (F/N 5) AND CONNECT WITH ADDED WIRE (F/N 8) TO PIN B2.
3. BAG U-CLAMP (F/N 24) & LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.
4. MARK CABLE LABEL (F/N 12) WITH PART NO. AND REVISION PER CDC STD. 1.30.008.

NOTES CONTINUED ON SHEET 2.

DWN	J.V.W.	9-3-92		TITLE	CABLE ASSY - MODULE DRIVE BUS IN
CHKD	J.H.	9-9-92			
ENG	J.H.	9-9-92			
MFG	J.H.	9-9-92			
APP	J.H.	9-30-92			
			DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	DWG No 96870930 THRU 96870934
			SCALE		

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	DOCUMENT NO 96870930/34	REV A
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NOTES CONTINUED:

5. FOLD END OF BRAIDED SLEEVING (F/N 22) INWARD TO FORM "FISHMOUTH"; FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE WRAP. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
6. INSTALL ADDITIONAL CRIMPED CONTACTS (F/N 16) IN ALL UNUSED CAVITIES OF CONNECTOR (F/N 14).
7. UNLESS OTHERWISE SPECIFIED ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1.

Figure 7-12.1. Cable - Module Drive Bus In (FCC EMI Qualified) (Sheet 1 of 5)

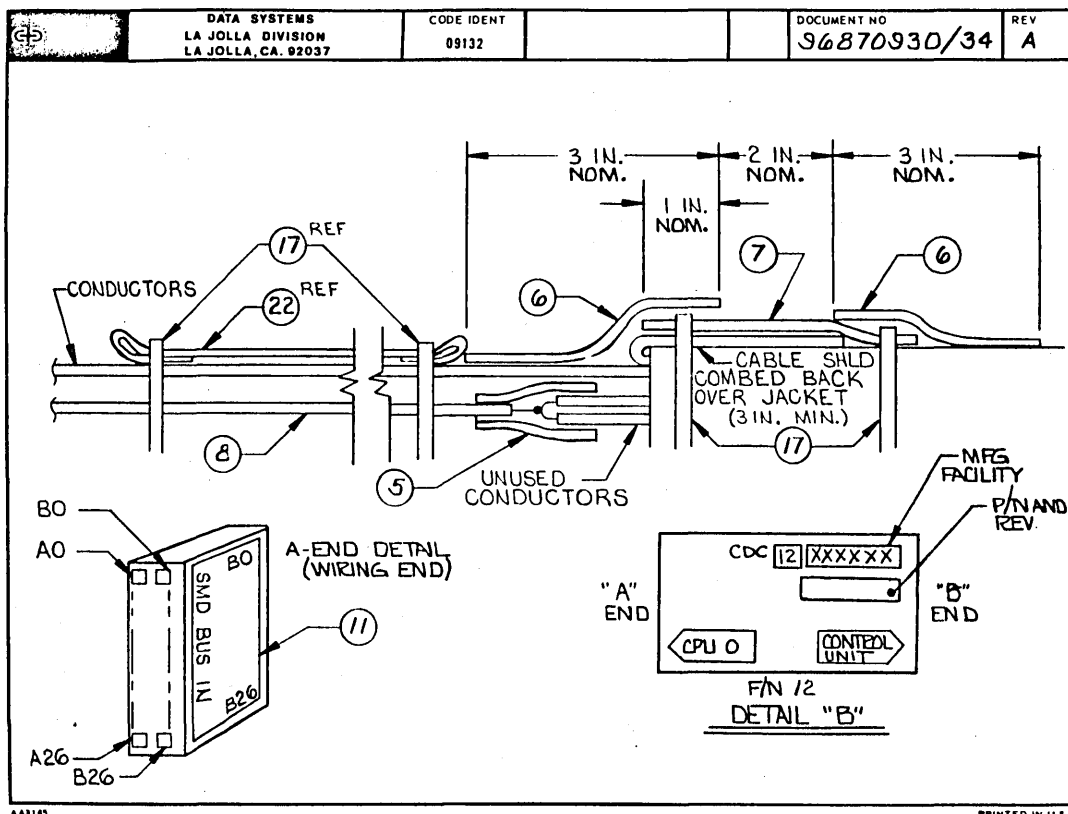
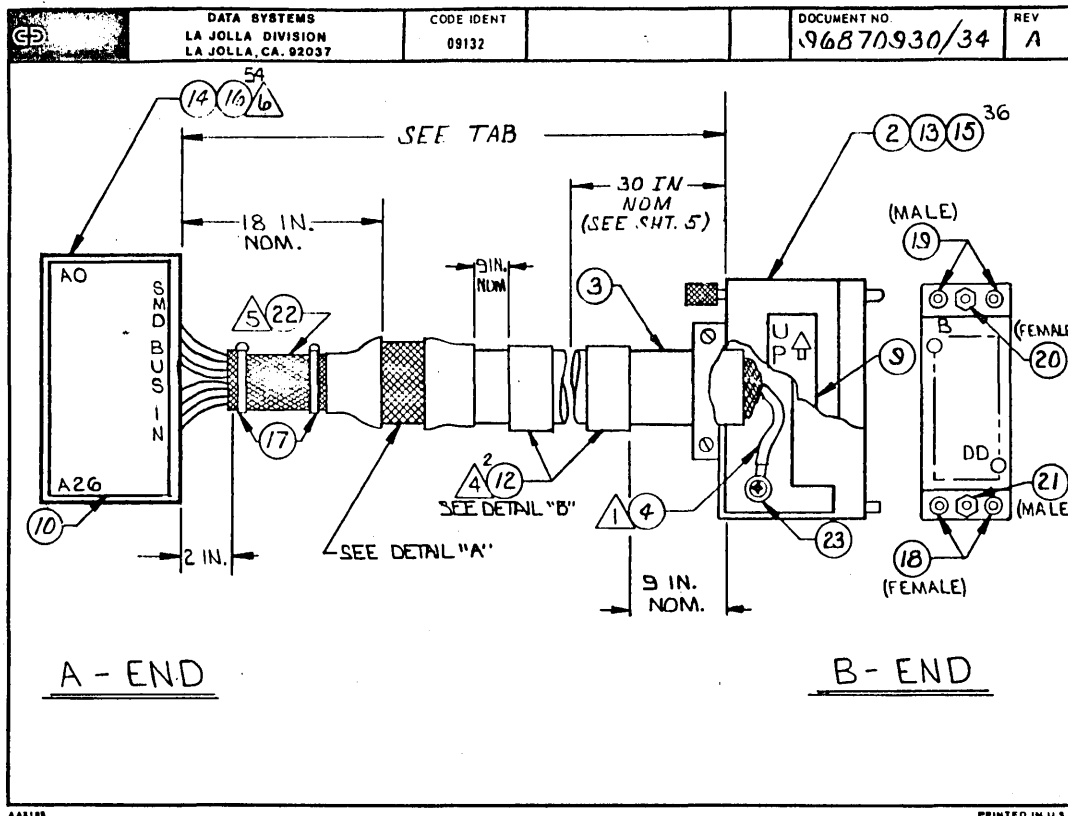
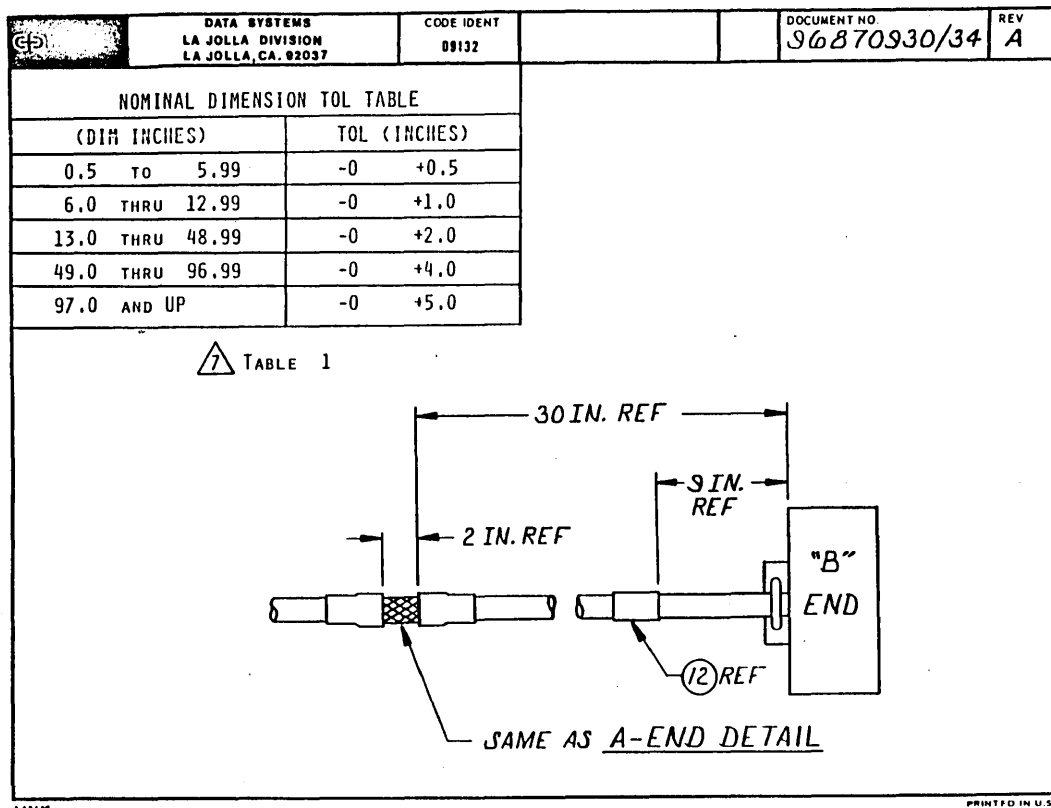


Figure 7-12.1. Cable - Module Drive Bus In (FCC EMI Qualified) (Sheet 2 of 5)



DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037					CODE IDENT 09132				WL		DOCUMENT NO 96870930/34		REV A	
CONDUCTOR IDENT.	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS			
1	3	24	0		A END	A4	16	B END	Y	15	TAG VALID } TW PR			
2			9		GND	B4			a		} TYP			
3			2			A5			d		CHECK END			
4			9		GND	B5			f					
5			4			A6			t		INDEX			
6			9		GND	B6			v					
7			5			A7			c		NORMAL END			
8			9		GND	B7			e					
9			6			A8			u		SECTOR			
10			9		GND	B8			w					
11			90			A9			h		ALERT 0			
12			9		GND	B9			k					
13			91			A10			j		ALERT 1			
14			9		GND	B10			m					
15			92			A12			F		BUS IN 2			
16			9		GND	B12			J					
17			93			A13			B		BUS IN 0			
18			9		GND	B13			D					
19			94			A14			E		BUS IN 1			
20	3	24	9		A END GND	B14	16	B END	H	15				

ASSEMBLY 2-1

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Figure 7-12.1. Cable - Module Drive Bus In (FCC EMI Qualified) (Sheet 3 of 5)

ASSEMBLY PARTS LIST

96870930	A	A	A	CABLE ASSY-MODULE DRIVE BUS IN	DS	GB145A	09/24/82		09/24/82	MF
ASSEMBLY NUMBER	REV	CL	DS	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	REV	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/OUT PART TYPE	PH	RE
1	A	10125806	2.00	PC	SPRING LOCK WASHERS (MED.)	IN			PPP1	N	
2	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
3	C	24518001	310.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
4	C	24528617	2.25	IN	INS SLEEVING, ELEC-BULK	IN			PPP3	N	
5	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 BLK BULK	IN			PPP4	N	
6	C	24534714	12.00	IN	SHRINK SLEEVE 3/4 BLK BULK	IN			PPP1	N	
7	C	24534811	10.00	IN	SHIELD ELEC BRAIDED-BULK	IN			PPP4	N	
8	C	24548301	18.00	IN	WIRE,ELECT,24 GA,PVC,UL,BLK	IN			PPP4	N	
9	B	39183344	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
10	B	39183375	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
11	B	39183376	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
12	B	39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	B	39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	A	39906904	1.00	PC	CONN, HOUSING- .100C.C. 54 CAV	IN			PPP4	N	
15	B	93645003	36.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
16	C	94245601	54.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
17	C	94277400	6.00	PC	STRAP CABLE TIE	IN			PPP4	N	
18	C	94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N	
19	C	94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N	
20	B	94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	B	94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	95048801	16.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	
					NUMBER OF LINE ITEMS = 24						
					HIGHEST FIND NUMBER = 24						

SCW5 REV 2-82 MF6 INFO

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Figure 7-12.1. Cable - Module Drive Bus In (FCC EMI Qualified) (Sheet 5 of 5)

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	DS21545	CL A RELEASED	JSH	6-15-79		AW	
B	DS21773	SEE ECO	KB	10-24-79		AW	

△ 6. INSTALL ADDITIONAL CRIMPED CONTACTS F/N 19 IN ALL UNUSED CAVITIES OF CONNECTOR F/N 17.

△ 5. FOLD END OF BRAIDED SLEEVING (F/N 23) INWARD TO FORM "FISHMOUTH"; FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE WRAP. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.

△ 4. MARK CABLE LABEL (F/N 21) WITH PART NO. AND REVISION. PER CDC STD 1.30.008

3. BAG U-CLAMP (F/N 16) & LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.

△ 2. AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER AND SLEEVE WITH 1 IN. F/N 22, AND CONNECT WITH ADDED WIRE (F/N 24) TO PIN B2.

△ 1. AT "B" END, STRIP BACK ENOUGH INSULATION TO BRAID APPROX 2.5 IN OF SHIELD; THEN SLEEVE WITH 2.25 IN. F/N 26 AND CONNECT AS SHOWN. ALSO, FOLD ALL UNUSED WIRES TOGETHER IN HALF AND SLEEVE WITH 1 IN. F/N 22.

DWN JHUMPHREYS 4-24-79		TITLE CABLE ASSY MODULE DRIVE BUS OUT	
CHKD [Signature]	6-9-79	DATA SYSTEMS	LA JOLLA DIVISION
ENG [Signature]	6-5-79	LA JOLLA DIVISION	LA JOLLA, CA 92037
MFG [Signature]	6-15-79	CODE IDENT 09132	DWG No 96720678
APP [Signature]	6-15-79	SCALE	SHEET 1 OF 7

INTER-DIVISIONAL DOCUMENT

Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.

AAL030 TD

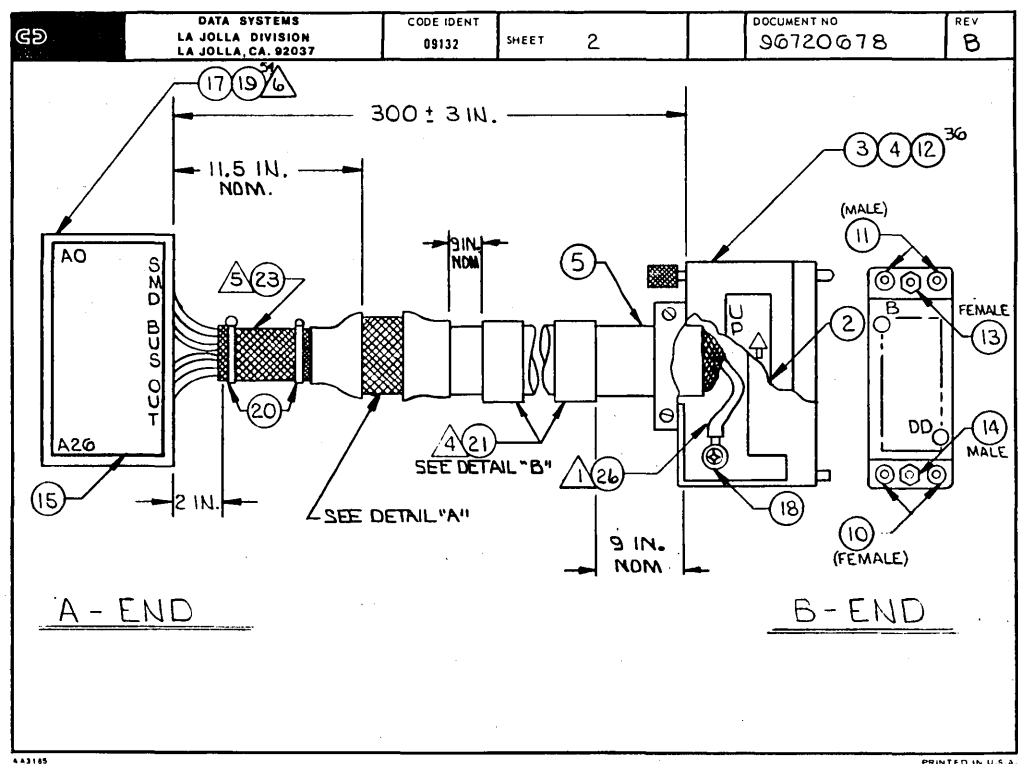
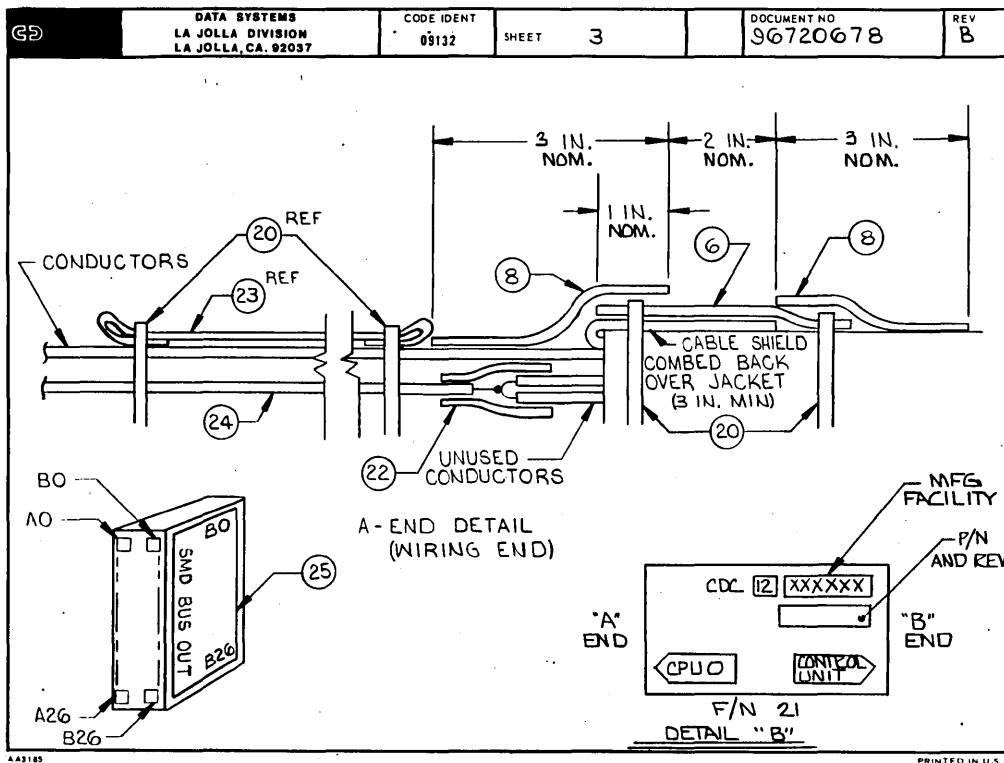


Figure 7-13. Cable Assembly - Module Drive Bus Out (Sheet 1 of 4)



GD	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	SHEET 4	DOCUMENT NO 96720678	REV B
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CONDUCTOR IDENT	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN	ACCESS FIND NO.	DESTINATION	ACCESS FIND NO.	REMARKS
1	5	24	0		A END	A3	B END	h	TAG BUS 3 TW PR
2			9		GND	B3		k	TYP
3			2			A4		d	TAG BUS 2
4			9		GND	B4		f	
5			4			A5		c	TAG BUS 1
6			9		GND	B5		e	
7			5			A6		z	TAG BUS 0
8			9		GND	B6		b	
9			6			A7		Y	BUS OUT P
10			9		GND	B7		a	
11			90			A8		u	RECYCLE
12			9		GND	B8		w	
13			91			A9		j	TAG BUS P
14			9		GND	B9		m	
15			92			A10		p	SYNC OUT
16			9		GND	B10		l	
17			93			A11		p	BUS OUT 4
18			9		GND	B11		s	
19			94			A12		u	BUS OUT 6
20	5	24	9		A END GND	B12	B END	w	

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Figure 7-13. Cable Assembly - Module Drive Bus Out (Sheet 2 of 4)

ASSEMBLY PARTS LIST

SPARE CODE
S : SPARE PARTS
N : NON SPARE PARTS

SHT. 7
MF

96720678	B	CLA	A	CABLE ASSY-MODULE DRV BUS OUT	DS	10445	06/06/79	10/22/79	14-1
ASSEMBLY NUMBER	REV	CLASS	OW	DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	OW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGED ORG. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PA	ON
1	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN			PPP1	N	
3	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
5	C	24518001	30300	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
26	C	24528617	225	IN	INS SLEEVING, ELEC-BULK	IN	021773	102279	PPP3	N	
22	C	24534710	200	IN	SHRINK SLEEVE 3/8 BLK BULK	IN	021773	102279	PPP4	N	
8	C	24534714	400	IN	SHRINK SLEEVE 3/4 BLK BULK	IN	021773	102279	PPP1	N	
6	C	24534811	500	IN	SHIELD ELEC BRAIDED-BULK	IN			PPP4	N	
24	C	24548301	1200	IN	WIRE-ELECT, 24 GA, PVC, UL, BLK	IN			PPP1	N	
22	A	25106920	400	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	021773	102279	PPP3	N	
8	A	25106922	1200	IN	INSUL SLEEVE SHRINK 3/4 BLACK	OUT	021773	102279	PPP3	N	
2	B	39183345	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
15	B	39183379	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
25	B	39183380	100	PC	LABEL, CONN BLOCK	IN			PPP4	N	
21	B	39296400	200	PC	LABEL, CABLE MARKING	IN	021773	102279	PPP4	N	
4	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
17	A	39906904	100	PC	CONN, HOUSING- .100C.C. 54 CAV	IN			PPP4	N	
12	B	93645003	3600	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
19	C	94245601	5400	PC	CONTACT-CRIMP INSERT SOCKET	IN	021773	102279	PPP4	N	
10	C	94245600	3600	PC	CONTACT-CRIMP INSERT SOCKET	OUT	021773	102279	PPP4	N	
20	C	94277400	400	PC	STRAP CABLE TIE	IN			PPP4	N	
31	C	94277400	400	PC	STRAP CABLE TIE	OUT	021773	102279	PPP4	N	
10	C	94288100	200	PC	PIN ASSY, CORNER GUIDE-FEMALE	IN			PPP4	N	
11	C	94288101	200	PC	PIN ASSY, CORNER GUIDE-MALE	IN			PPP4	N	
13	B	94780401	100	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
14	B	94780402	100	PC	SCREW-JACK-MALE	IN			PPP4	N	
23	A	95048801	1000	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
18	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
16	A	96785700	100	PC	CLAMP, U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 28
HIGHEST FIND NUMBER = 26

1A 2708 1 REV 775

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Figure 7-13. Cable Assembly - Module Drive Bus Out (Sheet 4 of 4)

TABULATION			REVISION RECORD						
PART NO.	LG/IN	TOL ±	REV	ECO	DESCRIPTION	DRAFT	DATE	CHKD	APP
96870935	300	10	A	DS/9381	OL A RELEASED	J.V.W.	9-30-82	AW	AW

NOTES:

- 1 AT "B" END, STRIP BACK ENOUGH INSULATION TO BRAID APPROX. 2.5 IN. OF SHIELD; THEN SLEEVE WITH 2.25 IN. (F/N 4) AND CONNECT AS SHOWN. ALSO, FOLD ALL UNUSED WIRES TOGETHER IN HALF AND SLEEVE WITH 1 IN. (F/N 5).
- 2 AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER AND SLEEVE WITH 1 IN. (F/N 5) AND CONNECT WITH ADDED WIRE (F/N 8) TO PIN B2.
3. BAG U-CLAMP (F/N 24) AND LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.
- 4 MARK CABLE LABEL (F/N 12) WITH PART NO. AND REVISION, PER CDC STD. 1.30.008.

NOTES CONTINUED ON SHEET 2

DWN	P. J. Wilson	9-3-82	CD	TITLE
CHKD	A. Yamada	9-9-82		CABLE ASSY-MODULE DRIVE BUS OUT
ENG	W. S. P. 200	7-24-82		
MFG	TOTANAL	9-24-82		
APP	P. 1.1.1.1	9-30-82		
			DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132
				DWG No 96870935 THRU 96870939
			SCALE	SHEET 1 OF 9

CD	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132		DOCUMENT NO 96870935/39	REV. A
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NOTES (CONTINUED)

- 5 FOLD END OF BRAIDED SLEEVING (F/N 22) INWARD TO FORM "FISHMOUTH", FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE WRAP. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THE END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
- 6 INSTALL ADDITIONAL CRIMPED CONTACTS (F/N 16) IN ALL UNUSED CAVITIES OF CONNECTOR (F/N 14).
- 7 UNLESS OTHERWISE SPECIFIED, ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1.

Figure 7-13.1. Cable - Module Drive Bus Out (FCC EMI Qualified) (Sheet 1 of 5)

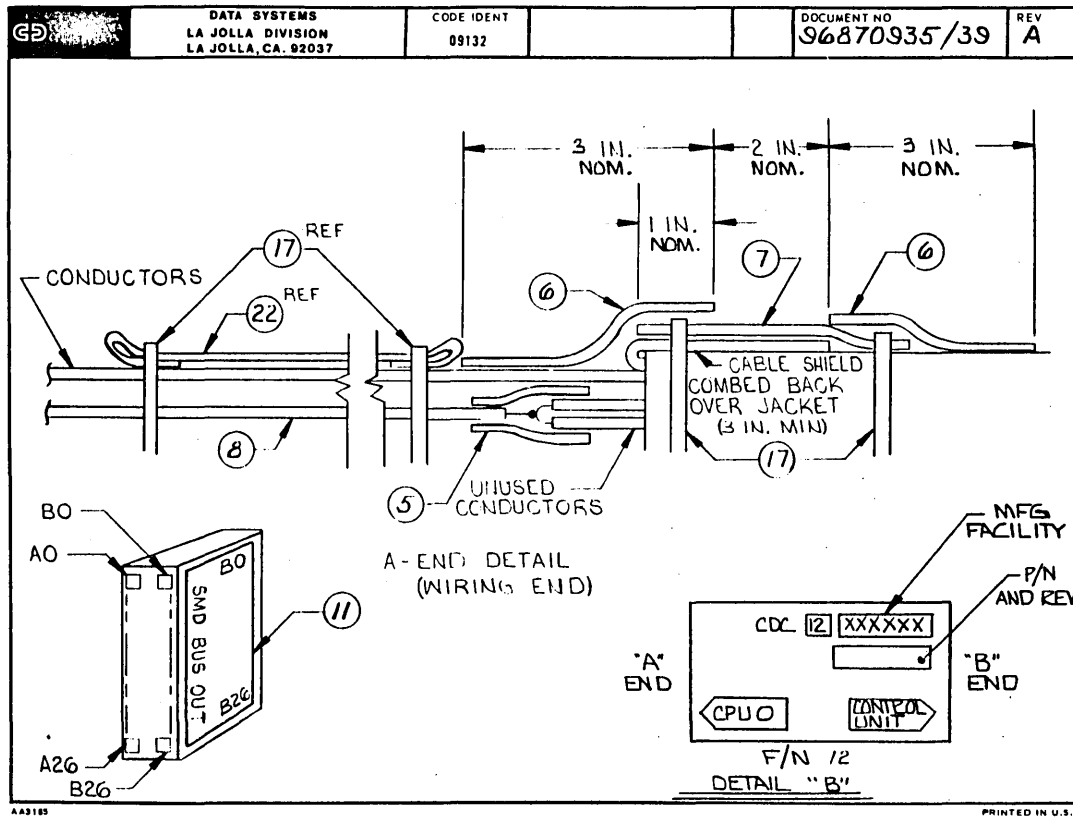
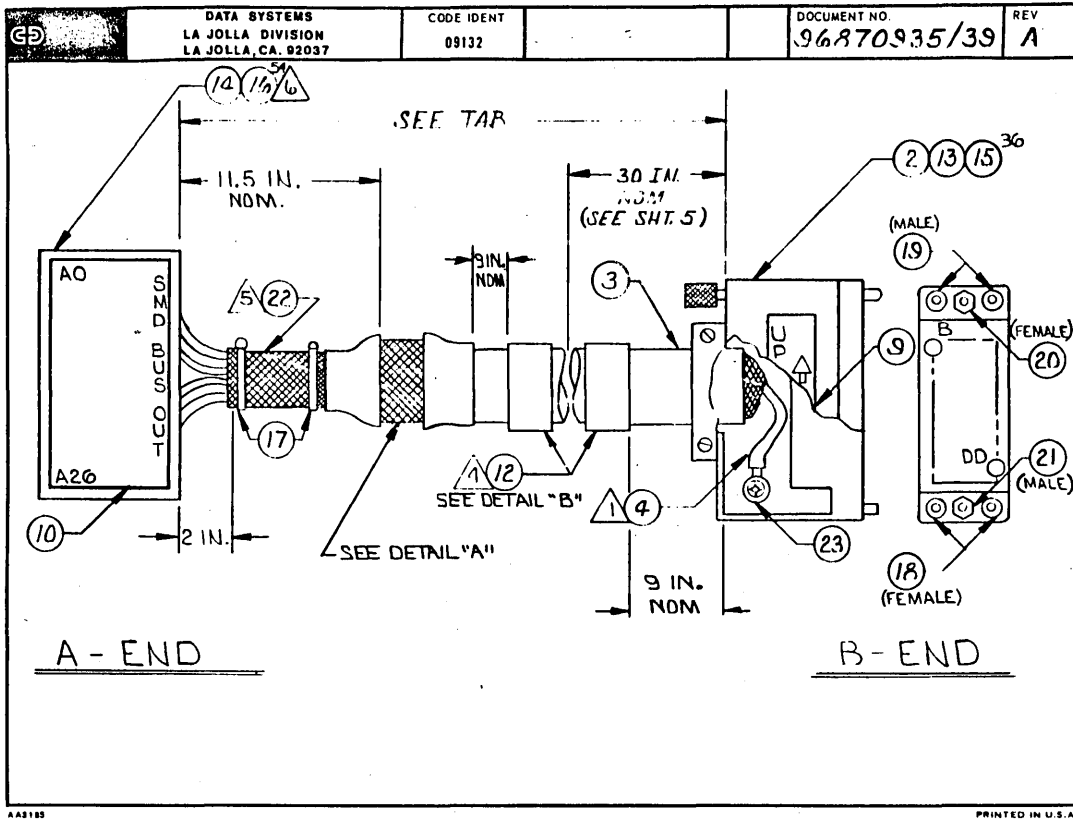
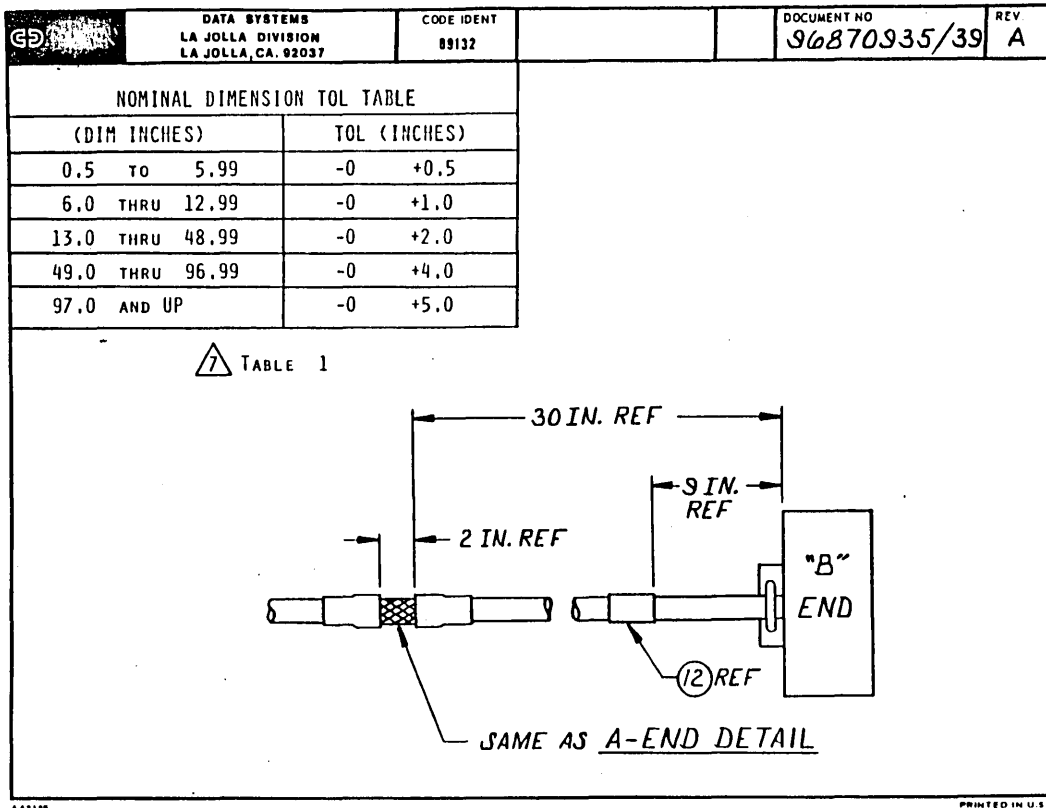


Figure 7-13.1. Cable - Module Drive Bus Out (FCC EMI Qualified) (Sheet 2 of 5)



		DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037			CODE IDENT 09132				WL	DOCUMENT NO 96870935/39		REV A
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CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS
1	3	24	0		A END	A3	16	B END	h	15	TAG BUS 3 TW PR
2			9		GND	B3			k		TYP
3			2			A4			d		TAG BUS 2
4			9		GND	B4			f		
5			4			A5			c		TAG BUS 1
6			9		GND	B5			e		
7			5			A6			z		TAG BUS 0
8			9		GND	B6			b		
9			6			A7			Y		BUS OUT P
10			9		GND	B7			a		
11			90			A8			u		RECYCLE
12			9		GND	B8			w		
13			91			A9			j		TAG BUS P
14			9		GND	B9			m		
15			92			A10			P		SYNC OUT
16			9		GND	B10			A		
17			93			A11			P		BUS OUT 4
18			9		GND	B11			S		
19			94			A12			U		BUS OUT 6
20	3	24	9		A END GND	B12	16	B END	W	15	

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Figure 7-13.1. Cable - Module Drive Bus Out (FCC EMI Qualified) (Sheet 3 of 5)

ASSEMBLY PARTS LIST

96870935	A	A	A	CABLE ASSY-MODULE DRV BUS OUT	DS	GB145A	09/24/82		09/24/82	MF
ASSEMBLY NUMBER	REV	CL	DR	ASSEMBLY DESCRIPTION	DESIGN NUMBER	PART USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	DR	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/OUT PART TYPE	PH	PC
1	A	10125806	2.00	PC	SPRING LOCK WASHERS (MED.)	IN			PPP1	N	
2	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
3	C	24518001	310.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
4	C	24528617	2.25	IN	INS SLEEVING, ELEC-BULK	IN			PPP3	N	
5	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 BLK BULK	IN			PPP4	N	
6	C	24534714	12.00	IN	SHRINK SLEEVE 3/4 BLK BULK	IN			PPP1	N	
7	C	24534811	10.00	IN	SHIELD ELEC BRAIDED-BULK	IN			PPP4	N	
8	C	24548301	12.00	IN	WIRE,ELECT,24 GA,PVC,UL,BLK	IN			PPP4	N	
9	R	39183345	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
10	R	39183379	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
11	R	39183380	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
12	R	39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	R	39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	A	39906904	1.00	PC	CONN, HOUSING- .100C.C. 54 CAV	IN			PPP4	N	
15	R	93645003	36.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
16	C	94245601	54.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
17	C	94277400	6.00	PC	STRAP CABLE TIE	IN			PPP4	N	
18	C	94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N	
19	C	94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N	
20	R	94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	R	94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	95048801	10.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	
NUMBER OF LINE ITEMS = 24											
HIGHEST FIND NUMBER = 24											

SDH REV 000 MF6 INFO

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Figure 7-13.1. Cable - Module Drive Bus Out (FCC EMI Qualified) (Sheet 5 of 5)

REVISION RECORD						
REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
FOR REVISION STATUS SEE SHEET B						

5. TIE BACK UNUSED WIRES AND INSULATE WITH SHRINK SLEEVING.

4. BAG U-CLAMPS (FIN 5) AND LOCK WASHERS (FIN 1) AND ATTACH TO CABLE.

3. TIE WHT WIRE OF EACH TWISTED PAIR TO GND BUS (FIN 4) "B" END.

2. USING FIN 3 CONNECT PINS A3 & A25 TO GND BUS (FIN 4).

1. IDENTIFY CABLE PER ES 38076000.

NOTES:

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.	DWN	B. K. L. 4-1-76	CONTROL DATA	TITLE	CABLE ASSY - BUS IN EXPANSION	
	CHKD	G. W. B. 5-5-76				
	ENG	E. A. H. 5-14-76	SMALL COMPUTER DEVELOPMENT DIVISION	CODE IDENT	96744226	
	MFG	R. H. M. 6-7-76	LA JOLLA, CA 92037	DRG No	A	
	APP	E. A. H. 6-15-76		SCALE	SHEET 1 OF 8	

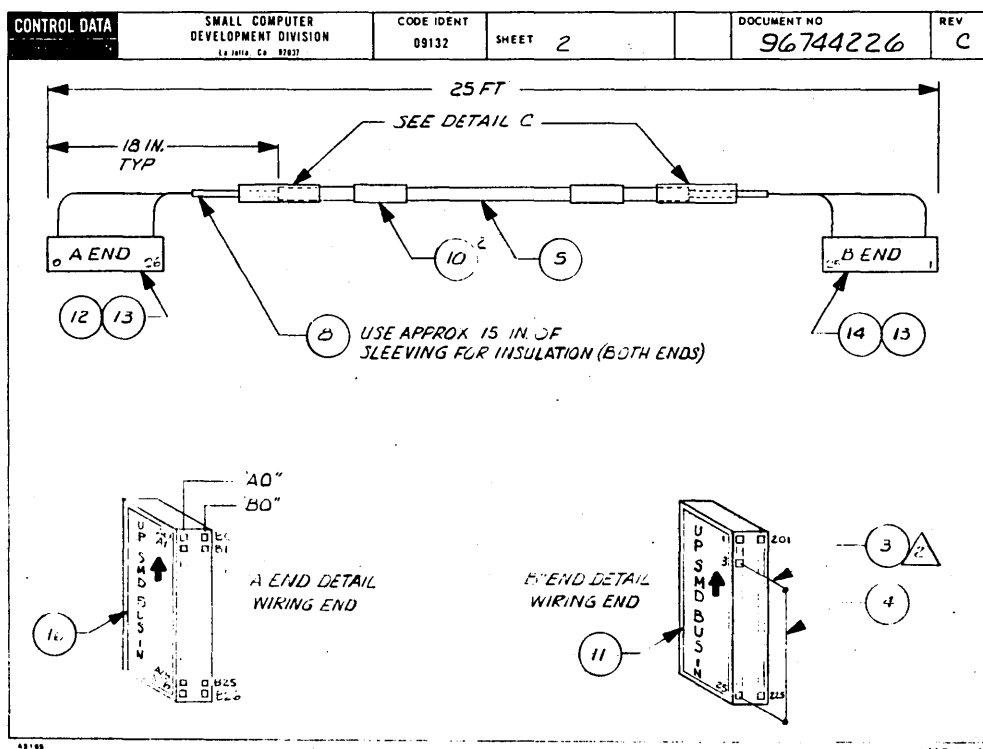
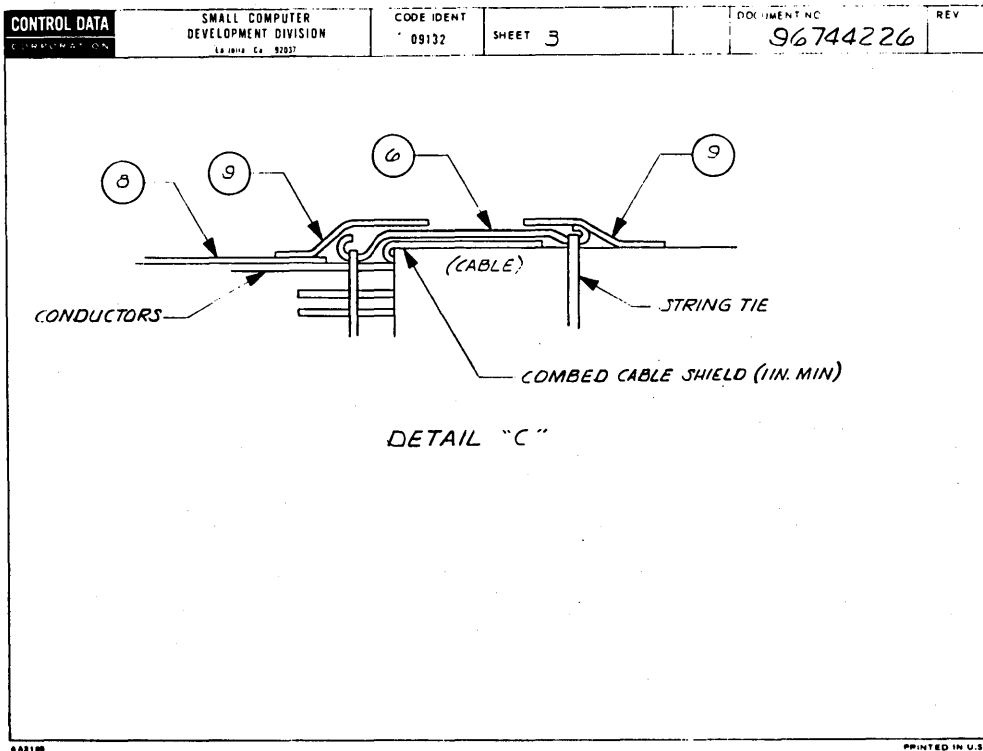


Figure 7-14. Cable Assembly - Bus In Expansion (Sheet 1 of 4)



CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION La Jolla Ca 92037			CODE IDENT 09132		SHEET 4		WL		DOCUMENT NO 96744226		REV. C	
CONDUCTOR IDENT.	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS			
1	5	24	0		A	END	A4	13	B	END	4	13	TAG VALID	
2	↑	↑	9		↑	GND	B4	↑	↑	GND		4	3 TYP	
3			2				A5				5	13	CHECK END	
4			9			GND	B5		GND			4		
5			4				A6				6	13	INDEX	
6			9			GND	B6		GND			4		
7			5				A7				7	13	NORMAL END	
8			9			GND	B7		GND			4		
9			6				A8				8	13	SECTOR	
10			9			GND	B8		GND			4		
11			90				A9				9	13	ALERT 0	
12			9			GND	B9		GND			4		
13			91				A10				10	13	ALERT 1	
14			9			GND	B10		GND			4		
15			92				A11				11	13	INT DA 0	
16			9			GND	B11		GND			4		
17			93				A12				12	13	BUS IN 2	
18			9			GND	B12		GND			4		
19	▼	▼	94		▼		A13	▼	▼		13	13	BUS IN 0	
20	5	24	9		A	END GND	B13	13	B	END GND		4		

LA10114 REV. 8-71

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Figure 7-14. Cable Assembly - Bus In Expansion (Sheet 2 of 4)

CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca. 92037			CODE IDENT 09132		SHEET 5		WL		DOCUMENT NO 96744226		REV C
CONDUCTOR IDENT.	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS		
21	5	24	95		AEND	A14	13	BEND	14	13	BUS IN 1		
22	▲	▲	9		▲ GND	B14	▲	▲ GND		4			
23			96			A15			15	13	BUS IN 3		
24			9		GND	B15		GND		4			
25			97			A16			16	13	INT DA 1		
26			9		GND	B16		GND		4			
27			98			A17			17	13	BUS IN 6		
28			9		GND	B17		GND		4			
29			900			A18			18	13	BUS IN 7		
30			9		GND	B18		GND		4			
31			910			A19			19	13	SELECT ACTIVE		
32			9		GND	B19		GND		4			
35			930			A21			21	13	BUS IN PARITY		
36			9		GND	B21		GND		4			
37			940			A22			22	13	BUS IN 5		
38			9		GND	B22		GND		4			
39	▼	▼	950		▼	A23	▼	▼	23	13	BUS IN 4		
40	5	24	9		AEND GND	B23	13	BEND GND		4			

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[illegible]

Figure 7-14. Cable Assembly - Bus In Expansion (Sheet 3 of 4)

ASSEMBLY PARTS LIST

SPARE CODE
S SPARE PARTS
N NON SPARE PARTS

SH 7

96744226	C	CLA	A	CABLE ASSY BUS IN EXPANSION	DS	MP17	05/13/76	11/29/76	1/ 1
ASSEMBLY NUMBER	REV	CLASS	OR	ASSEMBLY DESCRIPTION	CD	CD SOURCE	DATE	PROCESSING DATE	PAGE NUMBER

MF

FIND NUMBER	OR	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN	OUT	DATE EFFECTIVE	MAKE-BUY	PC	OR
1	A	10126407	400	PC	PLAIN WASHER NO. 10	OUT	014719	11/29/76	PPP1	N	N
1	A	10125806	400	PC	SPRING LOCK WASHERS (MED.)	IN	014719	11/29/76	PPP1	N	N
3	C	24501801	800	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	N
4	C	24501809	600	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	N
5	C	24518001	30000	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	N
6	C	24534811	300	IN	SHIELD ELEC BRAIDED-BULK	IN			PPP4	N	N
8	A	25196921	3000	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN			PPP3	N	N
9	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN			PPP3	N	N
11	B	39183342	100	PC	LABEL, CONN BLOCK	IN	014719	11/29/76	PPP4	N	N
16	B	39183346	100	PC	LABEL, CONN BLOCK	IN	014719	11/29/76	PPP4	N	N
10	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4	N	N
11	A	39397100	200	PC	LABEL, WRITE ON	OUT	014719	11/29/76	PPP4	N	N
12	A	39906904	100	PC	CONN, HOUSING-.100C.C. 54 CAV	IN			PPP4	N	N
13	C	94245609	6000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN	018394	05/13/76	PPP4	N	N
14	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N	N
15	A	96785700	200	PC	CLAMP U-TYPE .94 GAP	IN			PPP4	N	N

NUMBER OF LINE ITEMS = 16
HIGHEST FIND NUMBER = 16

SCMO

DWN	DR	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV
CHKD	DR	96744226	CABLE ASSY. BUS IN EXPANSION	DR	96744226	C
ENG	DR	09132	FIRST USED ON	SHEET 8		
MFG	DR	09132	CYBER 18-20			
APPR	DR	09132				

SHEET REVISION STATUS				REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	PC	OR	
A	18394	CL A. RELEASED	DR	6/5/76	PPP	N	
B	14591	SEE ECO	DR	8/30/76	PPP	N	
C	14719	SEE ECO	DR	12/4/76	PPP	N	

NOTES:

DETACHED LISTS

Figure 7-14. Cable Assembly - Bus In Expansion (Sheet 4 of 4)

REVISION RECORD						
REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
FOR REVISION STATUS SEE SHEET 7						

5 TIE BACK UNUSED WIRES AND INSULATE WITH SHRINK SLEEVING.

4 BAG U-CLAMPS FN15 AND LOCK WASHERS FN1 AND ATTACH TO CABLE.

3 TIE WHT WIRE OF EACH TWISTED PAIR TO GND BUS (FN4) 'B' END.

2 USING FN3 CONNECT PINS 81 & 102 ('B' END) TO GND BUS (FN4).

1. IDENTIFY CABLE PER ES 38876000.

NOTES:

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">OWN</td> <td style="width: 10%;">E. V. ...</td> <td style="width: 10%;">42076</td> </tr> <tr> <td>CHKD</td> <td>G. M. ...</td> <td>5576</td> </tr> <tr> <td>ENG</td> <td>R. H. ...</td> <td>5576</td> </tr> <tr> <td>MFG</td> <td>R. H. ...</td> <td>1</td> </tr> <tr> <td>APP</td> <td>S. A. ...</td> <td>6-15-76</td> </tr> </table>	OWN	E. V. ...	42076	CHKD	G. M. ...	5576	ENG	R. H. ...	5576	MFG	R. H. ...	1	APP	S. A. ...	6-15-76	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">CONTROL DATA</td> <td style="width: 50%;">TITLE</td> </tr> <tr> <td>CABLE ASSY- BUS OUT EXPANSION</td> <td></td> </tr> <tr> <td>SMALL COMPUTER DEVELOPMENT DIVISION 14 JANTA CA 91337</td> <td></td> </tr> <tr> <td>CODE IDENT</td> <td>09132</td> </tr> <tr> <td>REV</td> <td>A</td> </tr> <tr> <td>DWG No</td> <td>96744227</td> </tr> <tr> <td>SHEET</td> <td>1 OF 7</td> </tr> </table>	CONTROL DATA	TITLE	CABLE ASSY- BUS OUT EXPANSION		SMALL COMPUTER DEVELOPMENT DIVISION 14 JANTA CA 91337		CODE IDENT	09132	REV	A	DWG No	96744227	SHEET	1 OF 7
OWN	E. V. ...	42076																													
CHKD	G. M. ...	5576																													
ENG	R. H. ...	5576																													
MFG	R. H. ...	1																													
APP	S. A. ...	6-15-76																													
CONTROL DATA	TITLE																														
CABLE ASSY- BUS OUT EXPANSION																															
SMALL COMPUTER DEVELOPMENT DIVISION 14 JANTA CA 91337																															
CODE IDENT	09132																														
REV	A																														
DWG No	96744227																														
SHEET	1 OF 7																														

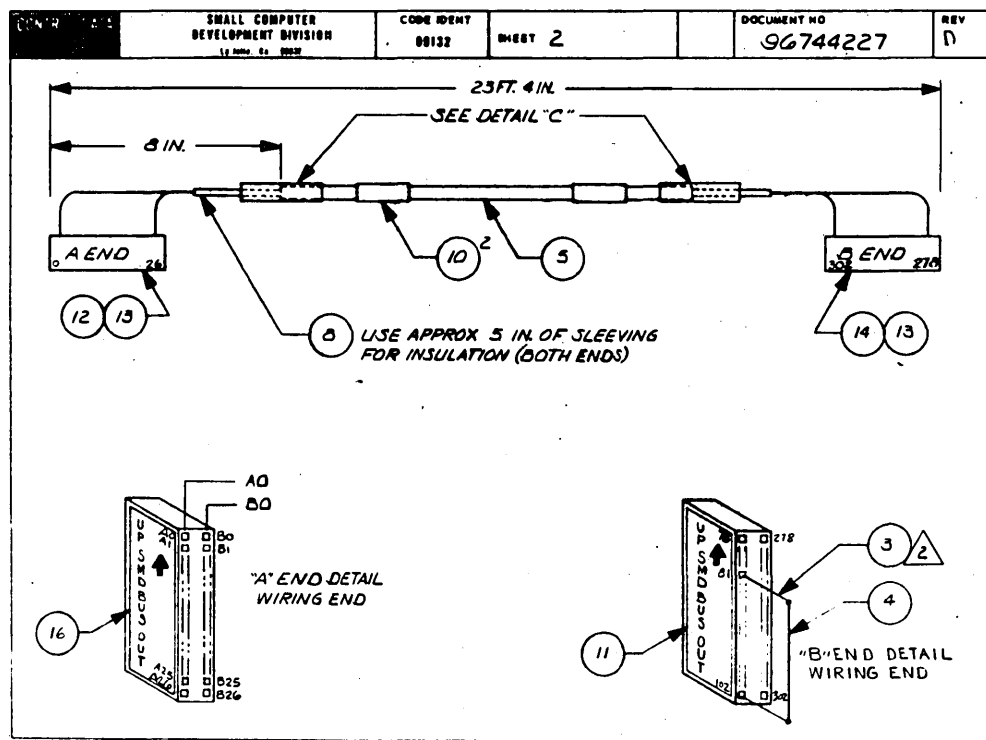
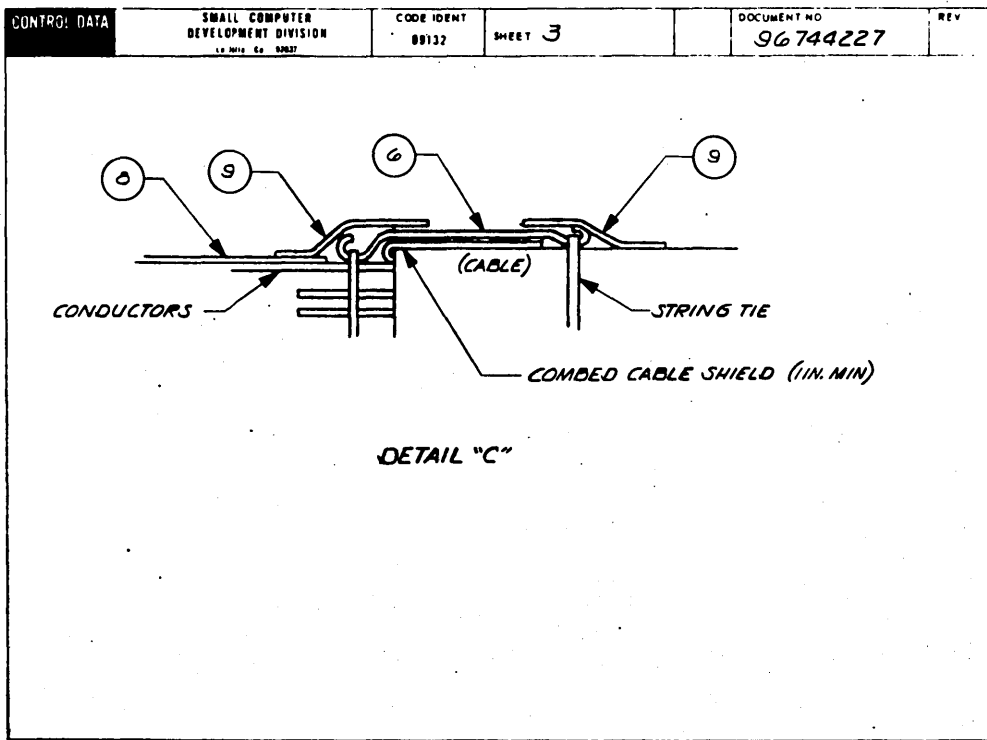


Figure 7-15. Cable Assembly - Bus Out Expansion (Sheet 1 of 4)



CONTROL DATA			SMALL COMPUTER DEVELOPMENT DIVISION La Jolla Ca. 92037			CODE IDENT 09132		SHEET 4		WL	DOCUMENT NO 96744227		REV C
CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS		
1	5	24	0		AEND	A3	13	BEND	B3	13	TAG BUS 3		
2	↑	↑	9		↑	GND B3	↑	↑	GND	4	3 TYP		
3			2			A4			B4	13	TAG BUS 2		
4			9			GND B4			GND	4			
5			4			A5			B5	13	TAG BUS 1		
6			9			GND B5			GND	4			
7			5			A6			B6	13	TAG BUS 0		
8			9			GND B6			GND	4			
9			6			A7			B7	13	BUS OUT PARITY		
10			9			GND B7			GND	4			
11			90			A8			B8	13	RECYCLE		
12			9			GND B8			GND	4			
13			91			A9			B9	13	TAG BUS PARITY		
14			9			GND B9			GND	4			
15			92			A10			90	13	SYNC OUT		
16			9			GND B10			GND	4			
17			93			A11			91	13	BUS OUT 4		
18			9			GND B11			GND	4			
19	↓	↓	94		↓	A12	↓	↓	92	13	BUS OUT 6		
20	5	24	9		↓	AEND GND	B12	13	BEND GND	4			

44180 REV. 8-71

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Figure 7-15. Cable Assembly - Bus Out Expansion (Sheet 2 of 4)

CONTROL DATA				SMALL COMPUTER DEVELOPMENT DIVISION		CODE IDENT		SHEET		WL		DOCUMENT NO.		REV.	
				LA 10110 CA 82037		09132		5				96744227		C	
CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS				
21	5	24	95		AEND	A13	13	BEND	93	13	BUS OUT 7				
22	▲	▲	9		▲	GND B13	▲	▲	GND	4					
23			96			A14			94	13	BUS OUT 5				
24			9			GND B14			GND	4					
25			97			A15			95	13	TAG OUT				
26			9			GND B15			GND	4					
27			98			A17			96	13	RESPONSE				
28			9			GND B17			GND	4					
29			900			A18			98	13	SELECT HOLD 0				
30			9			GND B18			GND	4					
31			910			A19			99	13	SELECT HOLD 1				
32			9			GND B19			GND	4					
33			920			A20			296	13	BUS OUT 2				
34			9			GND B20			GND	4					
35			930			A21			297	13	BUS OUT 0				
36			9			GND B21			GND	4					
37			940			A22			298	13	BUS OUT 1				
38			9			GND B22			GND	4					
39	▼	▼	950		▼	A23	▼	▼	299	13	BUS OUT 3				
40	5	24	9		A END GND	B23	13	B END GND		4					

LABOR REV. 6/71

PRINTED IN U.S.A.

40100 REV. 8/71

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CONTROL DATA CORPORATION

ASSEMBLY PARTS LIST

SPARE CODE
S SPARE PARTS
N NON SPARE PARTS

46744227		D	CLA	A	CAPLE ASSY BUS OUT EXPANSION		DS	MP17	05/13/76	11/12/77	1/ 1	HF	
ASSEMBLY NUMBER	REV	CLASS	CH	ST	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER	SH.6	
FIND NUMBER	CH	ST	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE NO.	DATE EFFECTIVE	MADE BY	CHK		
1	A		10125607	400	PC	PLAIN WASHER NO. 10	OUT	014719	11/19/76	PPF1	N		
1	A		10125606	400	PC	SPRING LOCK WASHERS (MED.)	IN	014719	11/19/76	PPF1	N		
3	C		24501801	600	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPF1	N		
4	C		24501809	600	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPF1	N		
5	C		24519001	30000	IN	CABLE FLEC 24 TWISTED PR	IN			PPF4	N		
7	C		24534811	300	IN	SHIELD ELECT BRAIDED-BULK	IN			PPF4	N		
7	A		25176921	1000	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN			PPF3	N		
7	A		25176922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN			PPF3	N		
11	M		39183343	100	PC	LABEL, CONN BLOCK	IN	014719	11/19/76	PPF4	N		
16	M		39183347	100	PC	LABEL, CONN BLOCK	IN	014719	11/19/76	PPF4	N		
10	M		39296400	200	PC	LABEL, CARLE MARKING	IN			PPF4	N		
11	A		39397100	100	PC	LABEL, WHITE ON	OUT	014719	11/19/76	PPF4	N		
12	A		39906904	100	PC	CONN. HOUSING- .100C.L. 54 CAV	IN			PPF4	N		
13	C		94245609	6000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPF4	N		
14	C		94360805	100	PC	HOUSING-COMM, SOCKET .125 50CAV	IN			PPF4	N		
15	A		96785700	200	PC	CLAMP D-TYPE .44 GAP	IN			PPF4	N		

NUMBER OF LINE ITEMS = 16
HIGHEST LINE NUMBER = 16

Figure 7-15. Cable Assembly - Bus Out Expansion (Sheet 3 of 4)

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60475800 C

REVISION RECORD							
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
FOR REVISION STATUS, SEE SHEET 9							

9 ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1.

8 FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS F/N 13.

7 FOLD END OF BRAIDED SLEEVING (F/N 18) INWARD TO FORM FISHMOUTH. FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2-INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.

6 AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER, SLEEVE WITH F/N 19 AND CONNECT WITH 15 INCH ADDED WIRE (F/N 2) TO PIN B4 ALONG WITH COND. 2.

5 TIE UNUSED WIRES TOGETHER (B-END), INSULATE WITH 1 INCH F/N 19, RUN AN 18 INCH WIRE F/N 2 TO PIN 3 (B-END) ALONG WITH CONDUCTOR 49.

4 BAG U-CLAMPS (F/N 17) AND LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.

3 TIE WHITE WIRES OF ALL USED TWISTED PAIRS, (B END ONLY) TOGETHER. INSULATE WITH 1 INCH F/N 19 AND RUN AN 8 INCH WIRE F/N 2 TO PIN 25 ALONG WITH CONDUCTOR 49.

2 TWO WIRES IN 1 CONTACT.

1 IDENTIFY CABLE PER ES 1.30.008.

NOTES: UNLESS OTHERWISE SPECIFIED.

DWN	T	4-12-79	TITLE	CABLE ASSY - BUS IN EXPANSION		
CHKD		5-24-79				
ENG		6-1-79				
MFG		6-13-79				
APP						

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	DWG No A 88893703	REV. A
--	---------------------	----------------------	-----------

SCALE: _____ SHEET 1 OF 9

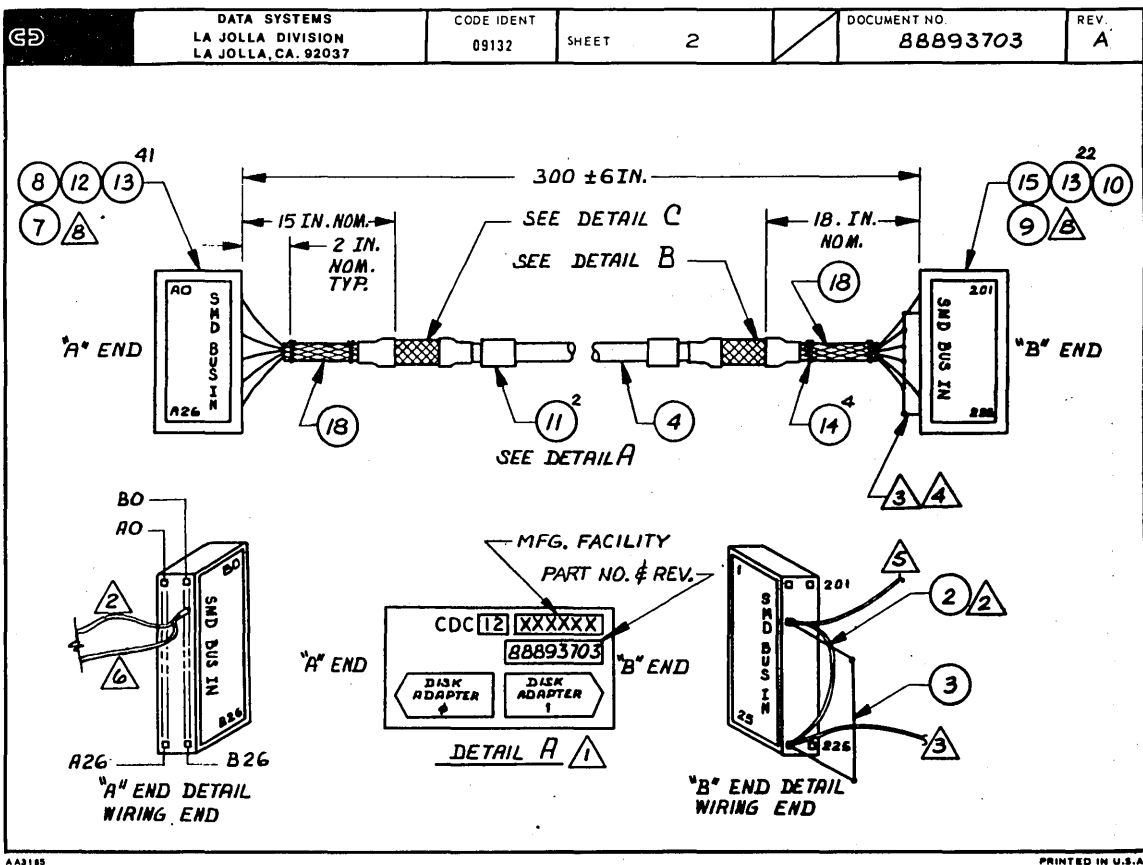


Figure 7-16. Cable Assembly - Bus In Expansion (Sheet 1 of 5)

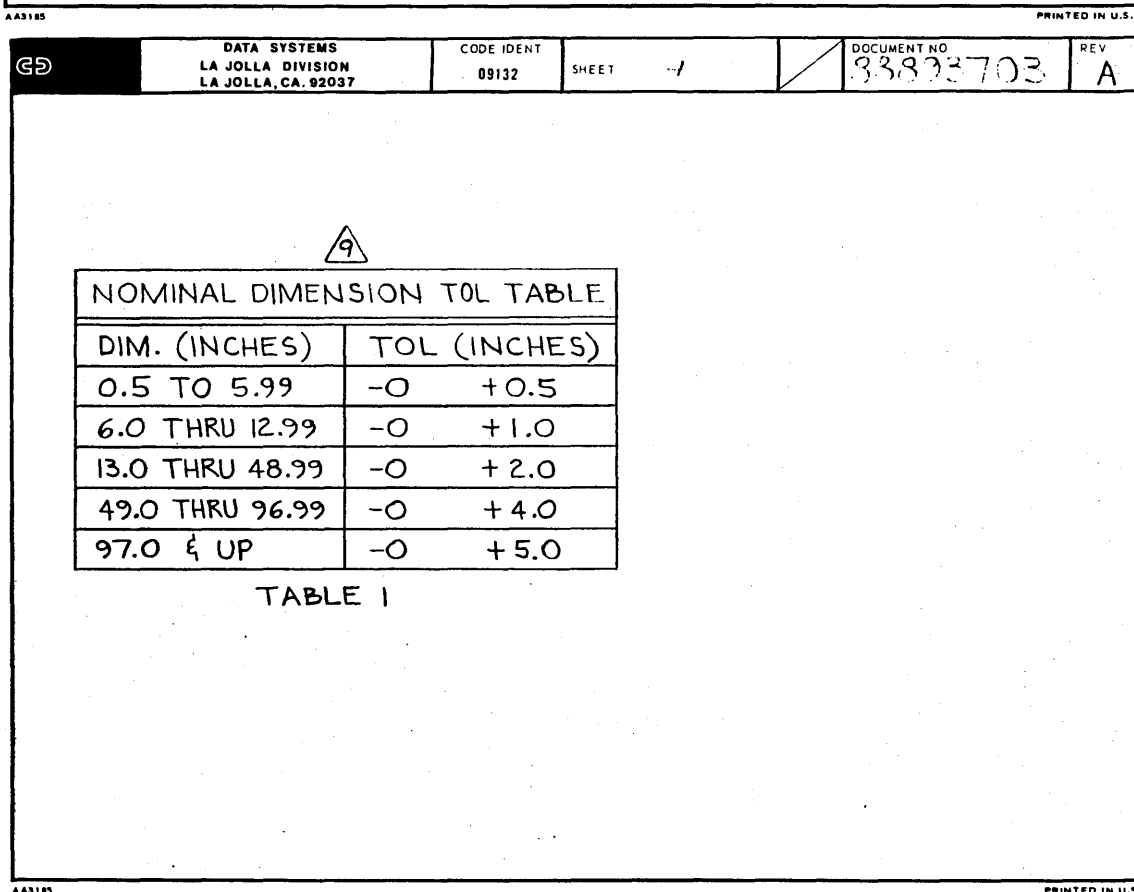
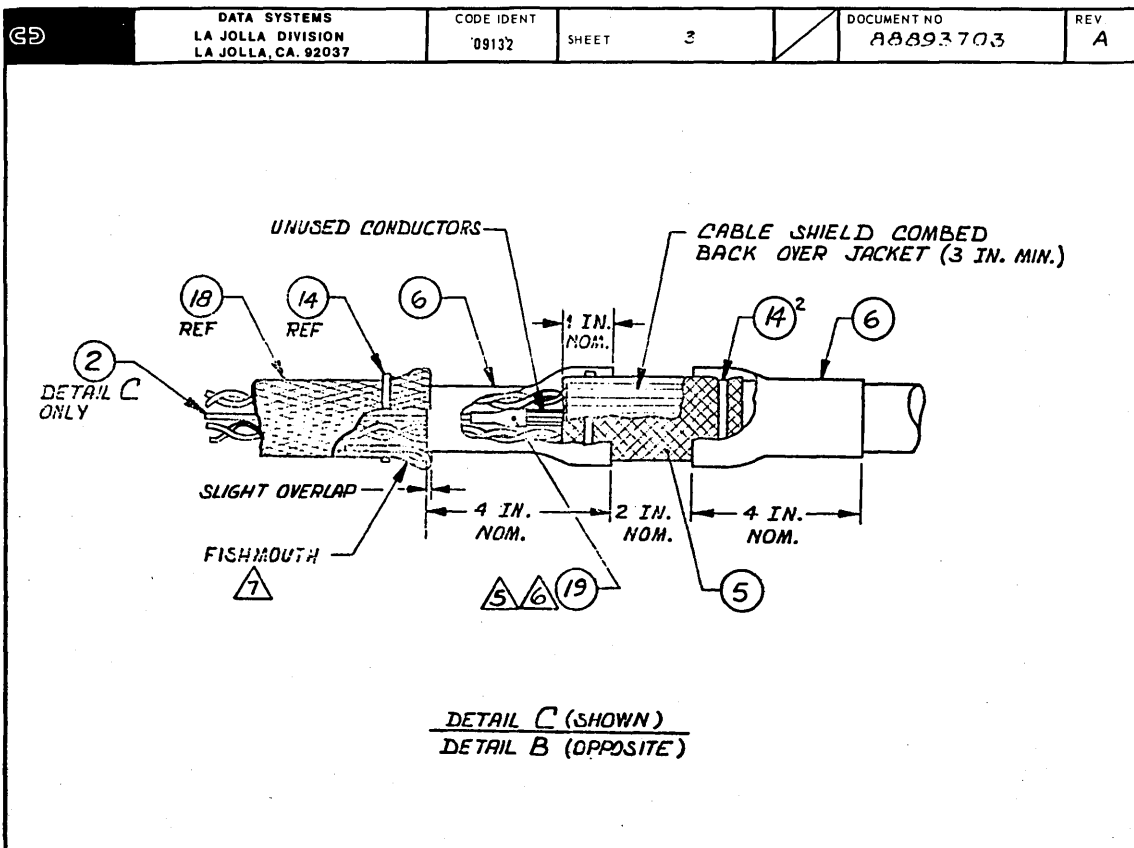


Figure 7-16. Cable Assembly - Bus In Expansion (Sheet 2 of 5)

CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca 92037			CODE IDENT 09132		SHEET 5		WL		DOCUMENT NO. 88893703		REV. A
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) INCHES	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS		
1	4	24	0	300	A	END	A4	13	B	END	4	13	TAG VALID TW/PR
2	↑	↑	9	↑	↑	GND	B4	↑	↑	GND	3		
3			2				A5				5	13	CHECK END
4			9			GND	B5			GND	3		
5			4				A6				6	13	INDEX
6			9			GND	B6			GND	3		
7			5				A7				7	13	NORMAL END
8			9			GND	B7			GND	3		
9			6				A8				8	13	SECTOR
10			9			GND	B8			GND	3		
11			90				A9				9	13	ALERT 0
12			9			GND	B9			GND	3		
13			91				A10				10	13	ALERT 1
14			9			GND	B10			GND	3		
15			92				A11				11	13	INT DA 0
16			9			GND	B11			GND	3		
17			93				A12				12	13	BUS IN 2
18			9			GND	B12			GND	3		
19	↓	↓	94	↓	↓		A13	↓	↓		13	13	BUS IN 0
20	4	24	9	300	A	END GND	B13	13	B	END GND	3		

ASBIES REV. 8/75

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CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca 92037			CODE IDENT 09132		SHEET 6		WL		DOCUMENT NO. 88893703		REV. A
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) INCHES	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS		
21	4	24	95	300	A	END	A14	13	B	END	14	13	BUS IN 1
22	↑	↑	9	↑	↑	GND	B14	↑	↑	GND	3		
23			96				A15				15	13	BUS IN 3
24			9			GND	B15			GND	3		
25			97				A16				16	13	INT DA 1
26			9			GND	B16			GND	3		
27			98				A17				17	13	BUS IN 6
28			9			GND	B17			GND	3		
29			900				A18				18	13	BUS IN 7
30			9			GND	B18			GND	3		
31			910				A19	↓			19	13	SELECT ACTIVE
32			9			GND	B19	13		GND	3		
33			920			GND	6			GND	5		UNUSED WIRES GND
34			9			GND	6			GND	5		UNUSED WIRES GND
35			930				A21	13			22	13	BUS IN PARITY
36			9			GND	B21	↑		GND	3		
37			940				A22				23	13	BUS IN 5
38			9			GND	B22			GND	3		
39	↓	↓	950	↓	↓		A23	↓	↓		24	13	BUS IN 4
40	4	24	9	300	A	END GND	B23	13	B	END GND	3		

ASBIES REV. 8/75

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Figure 7-16. Cable Assembly - Bus In Expansion (Sheet 3 of 5)

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
FOR REVISION STATUS, SEE SHEET 9						

- 9 ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1.
- 8 FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS F/N 13.
- 7 FOLD END OF BRAIDED SLEEVING (F/N 18) INWARD TO FORM FISHMOUTH. FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE. THEN FORM FISHMOUTH AT OTHER END, AND STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2-INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
- 6 AT "A" END, SOLDER ALL UNUSED WIRES TOGETHER, SLEEVE WITH F/N 19 AND CONNECT WITH 11 INCH ADDED WIRE (F/N 2) TO PIN B3 ALONG WITH COND. 2.
- 5 TIE UNUSED WIRES TOGETHER (B-END), INSULATE WITH 1 INCH F/N 19 & RUN A 13 INCH WIRE F/N 2 TO PIN 102 ALONG WITH CONDUCTOR 49.
4. BAG U-CLAMPS (F/N 17) AND LOCK WASHERS (F/N 1) AND ATTACH TO CABLE.
- 3 TIE WHITE WIRES OF ALL USED TWISTED PAIRS (B END ONLY) TOGETHER. INSULATE WITH 1 INCH F/N 19 AND RUN A 6 INCH WIRE F/N 2 TO PIN 81 ALONG WITH CONDUCTOR 49.
- 2 TWO WIRES IN 1 CONTACT.
- 1 IDENTIFY CABLE PER ES 1.30.008.

NOTES: UNLESS OTHERWISE SPECIFIED

DWN	4-12-79	CHKD	5-24-79	ENG	6-1-79	MFG	6-13-79	APP		TITLE	CABLE ASSY - BUS OUT EXPANSION		
								DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037		CODE IDENT	09132	DWG No	88893704
								SCALE				SHEET	1 OF 9

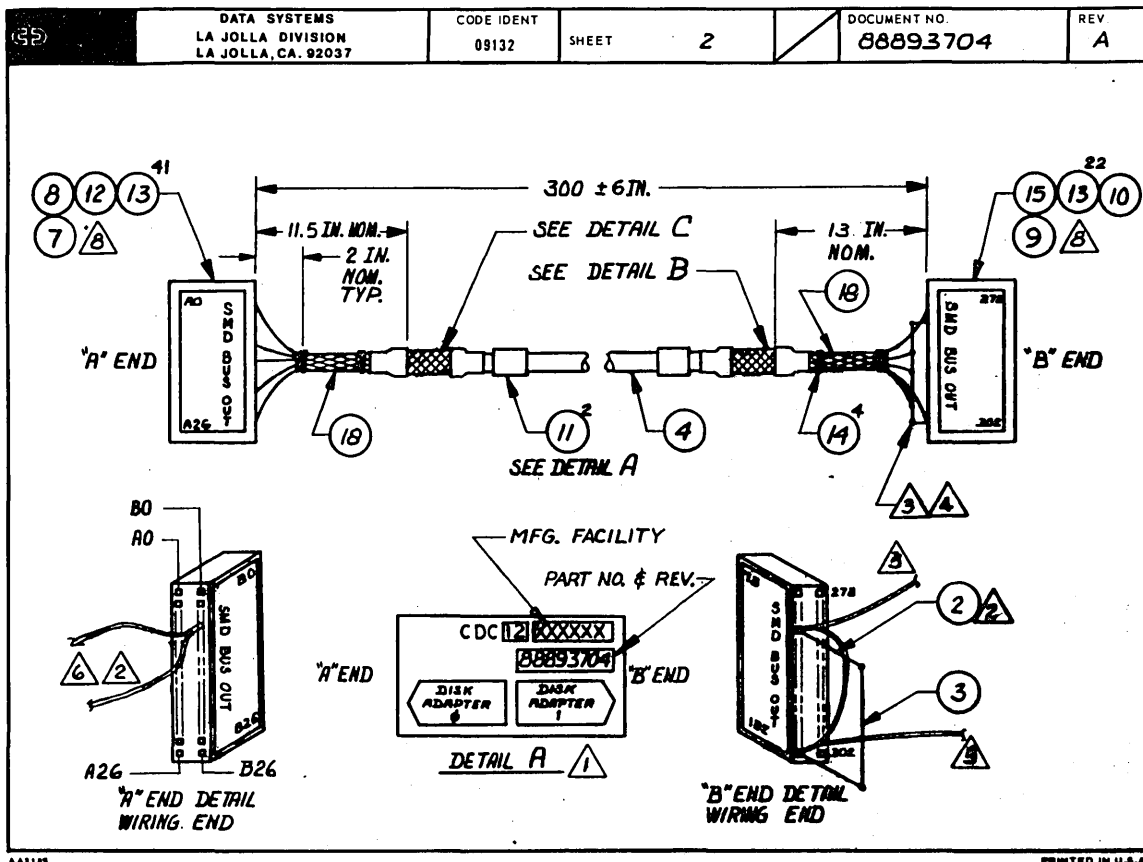


Figure 7-17. Cable Assembly - Bus Out Expansion (Sheet 1 of 5)

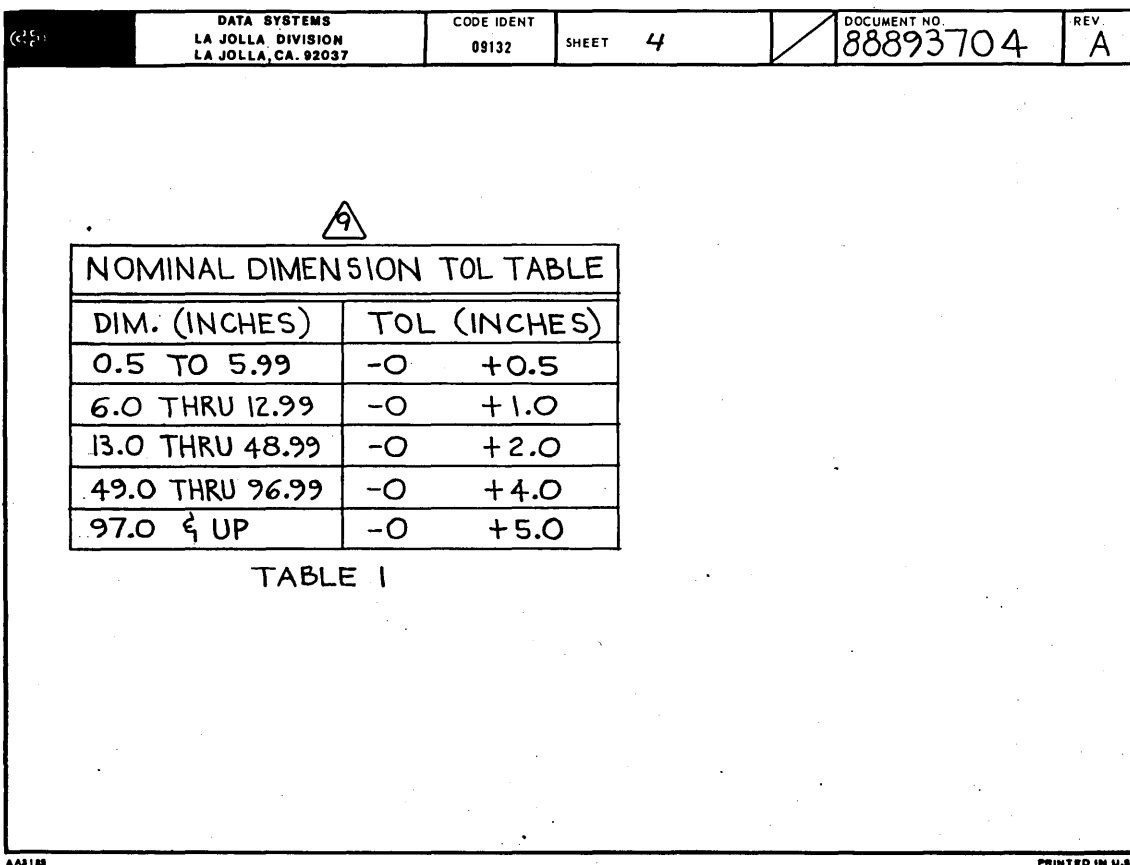
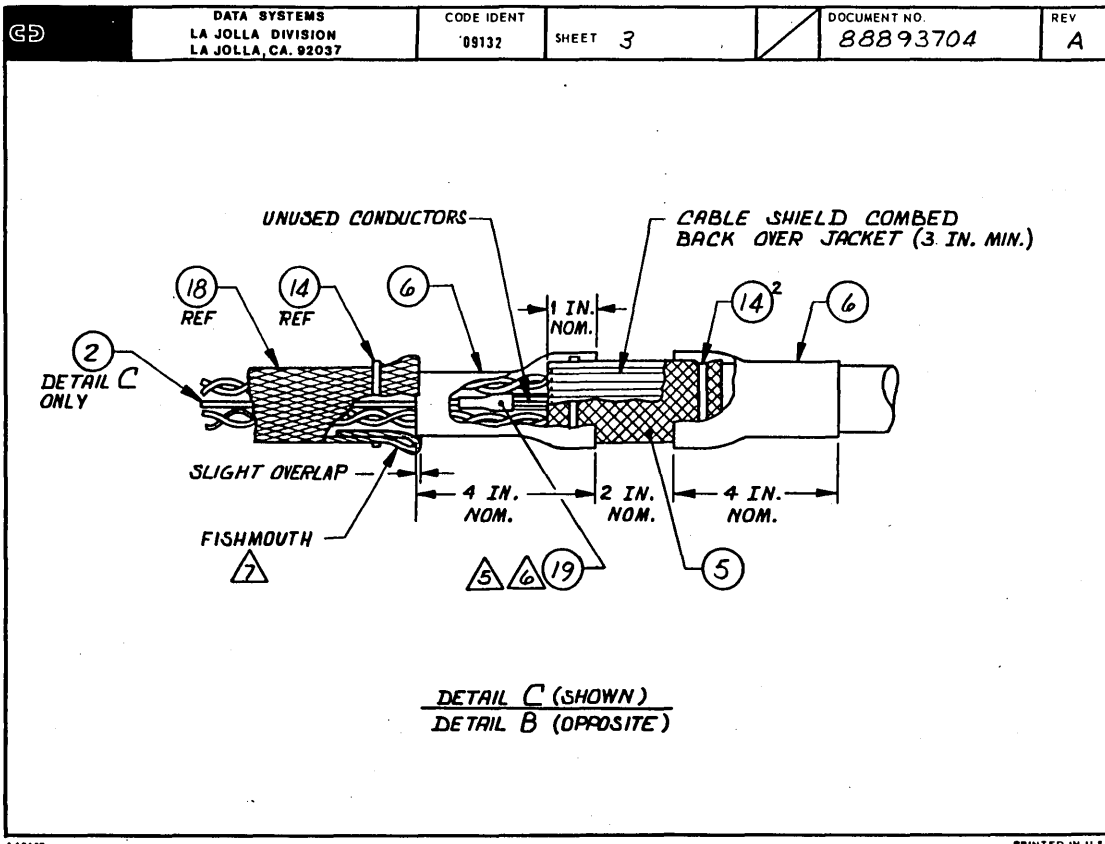


Figure 7-17. Cable Assembly - Bus Out Expansion (Sheet 2 of 5)

SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca 92037					CODE IDENT 09132	SHEET 5	WL	DOCUMENT NO. 88893704	REV. A		
CONDUCTOR IDENT	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) INCHES	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
1	4	24	0	300	AEND	A3	13	BEND	B3	13	TAG BUS 3 } TW/PR
2	↑	↑	9	↑	↑	GND B3	↑	↑	GND	3	
3			2			A4			B4	13	TAG BUS 2
4			9			GND B4			GND	3	
5			4			A5			B5	13	TAG BUS 1
6			9			GND B5			GND	3	
7			5			A6			B6	13	TAG BUS 0
8			9			GND B6			GND	3	
9			6			A7			B7	13	BUS OUT PARITY
10			9			GND B7			GND	3	
11			90			A8			B8	13	RECYCLE
12			9			GND B8			GND	3	
13			91			A9			B9	13	TAG BUS PARITY
14			9			GND B9			GND	3	
15			92			A10			B10	13	SYNC OUT
16			9			GND B10			GND	3	
17			93			A11			B11	13	BUS OUT 4
18			9			GND B11			GND	3	
19	↓	↓	94	↓	↓	A12	↓	↓	B12	13	BUS OUT 6
20	4	24	9	300	AEND GND	B12	13	BEND GND	3		

10100 REV. 9/71

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AAB100 REV. 6/71

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CONTROL DATA		SMALL COMPUTER DEVELOPMENT DIVISION LA JOLLA, CA 92037			CODE IDENT 09132		SHEET 6		WL		DOCUMENT NO. 88893704		REV. A	
CONDUCTOR IDENT	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) INCHES	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS			
21	4	24	95	300	A	END	A13	13	B	END	B13	13	BUS OUT 7	
22	▲	▲	9	▲	▲	GND	B13	▲	▲	GND	3			
23			96				A14				94	13	BUS OUT 5	
24			9			GND	B14			GND	3			
25			97				A15				95	13	TAG OUT	
26			9			GND	B15			GND	3			
27			98				A17				96	13	RESPONSE	
28			9			GND	B17			GND	3			
29			900				A18				98	13	SELECT HOLD 0	
30			9			GND	B18			GND	3			
31			910				A19				99	13	SELECT HOLD 1	
32			9			GND	B19			GND	3			
33			920				A20				296	13	BUS OUT 2	
34			9			GND	B20			GND	3			
35			930				A21				297	13	BUS OUT 0	
36			9			GND	B21			GND	3			
37			940				A22				298	13	BUS OUT 1	
38			9			GND	B22			GND	3			
39	▼	▼	950	▼	▼		A23	▼	▼		299	13	BUS OUT 3	
40	4	24	9	300	A	END GND	B23	13	B	END GND	3			

AAB100 REV. 6/71

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Figure 7-17. Cable Assembly - Bus Out Expansion (Sheet 3 of 5)

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7-69/7-70 ●

TABULATION			REVISION RECORD						
PART NO	LENGTH	TOL ±	REV	CO	DESCRIPTION	DRAFT	DATE	CHKD	APP
88915300	240 IN	2							
01	360 IN	3							
02	480 IN	4							
03	600 IN	6							

FOR REVISIONS SEE SH 15

△ STRIP BACK ENOUGH INSULATION TO BRAID APPROX 3 IN. OF SHIELD AND CONNECT AS SHOWN IN DETAIL D.

△ AT "B" END OF CABLE TIE BACK UNUSED WIRE PAIRS AND INSULATE WITH SHRINK SLEEVING.

4. BAG CABLE CLAMP (F/N 14), U-CLAMP (F/N 22), 8-32 SCREW (F/N 15), LOCK WASHERS (F/N 16) AND ATTACH TO CABLE.

△ WHT. WIRE OF EACH TWISTED PAIR & EACH UNUSED PAIR TIES TO GROUND BUS (F/N 18) AT "A" END.

△ USING F/N 17 CONNECT PINS 3 & 25 TO CRIMP CONTACTS AND SOLDER. CONNECT TO F/N 18 USING SOLDER.

1. IDENTIFY CABLE PER ES 38876000.

NOTES:

INTER-DIVISIONAL DOCUMENT

Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.

DRAWN	1-15-74	CHKD	1-15-74	ENG	1-16-75	MFG	1-24-75	APP	1-24-75
TITLE CABLE ASSY-DISK ADAPTER TO CONTROL UNIT-SINGLE CPU BUS IN					CODE IDENT 09132				
SCALE 1:1					DOCUMENT NO. 88915300/03				
SHEET 1					REV. D				

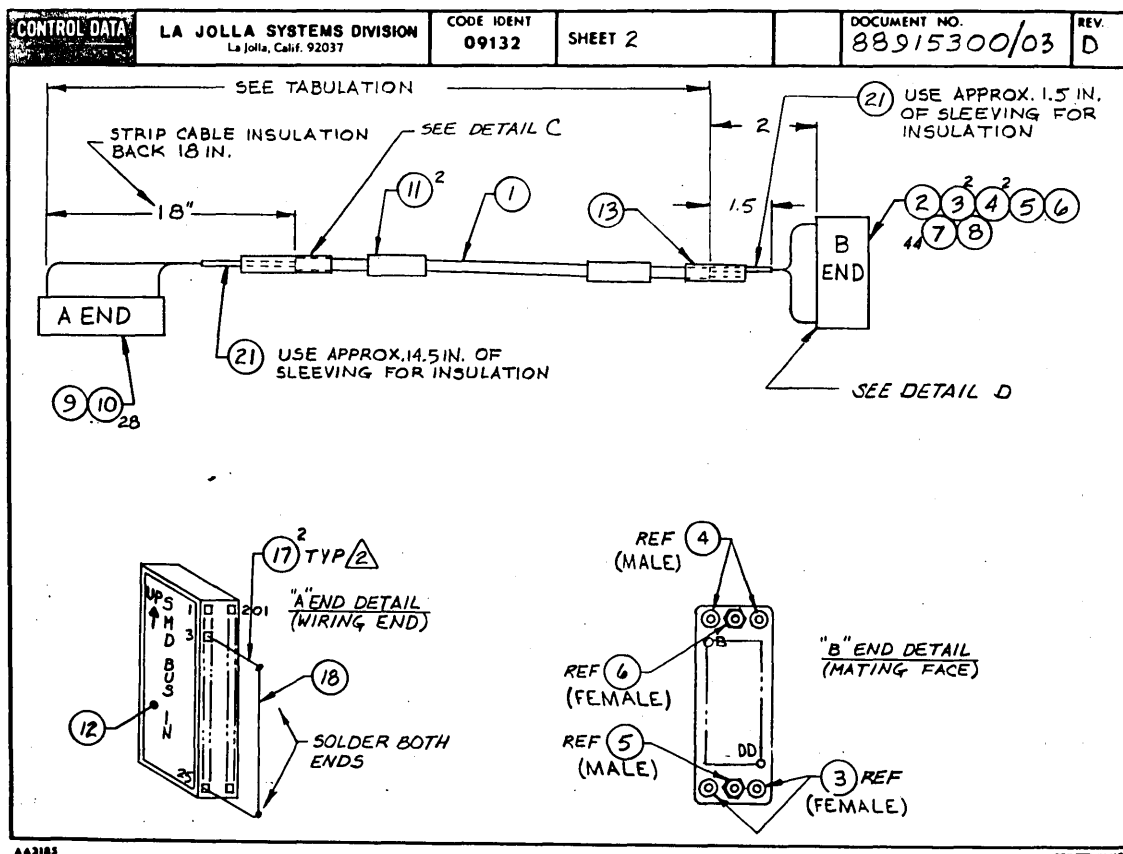
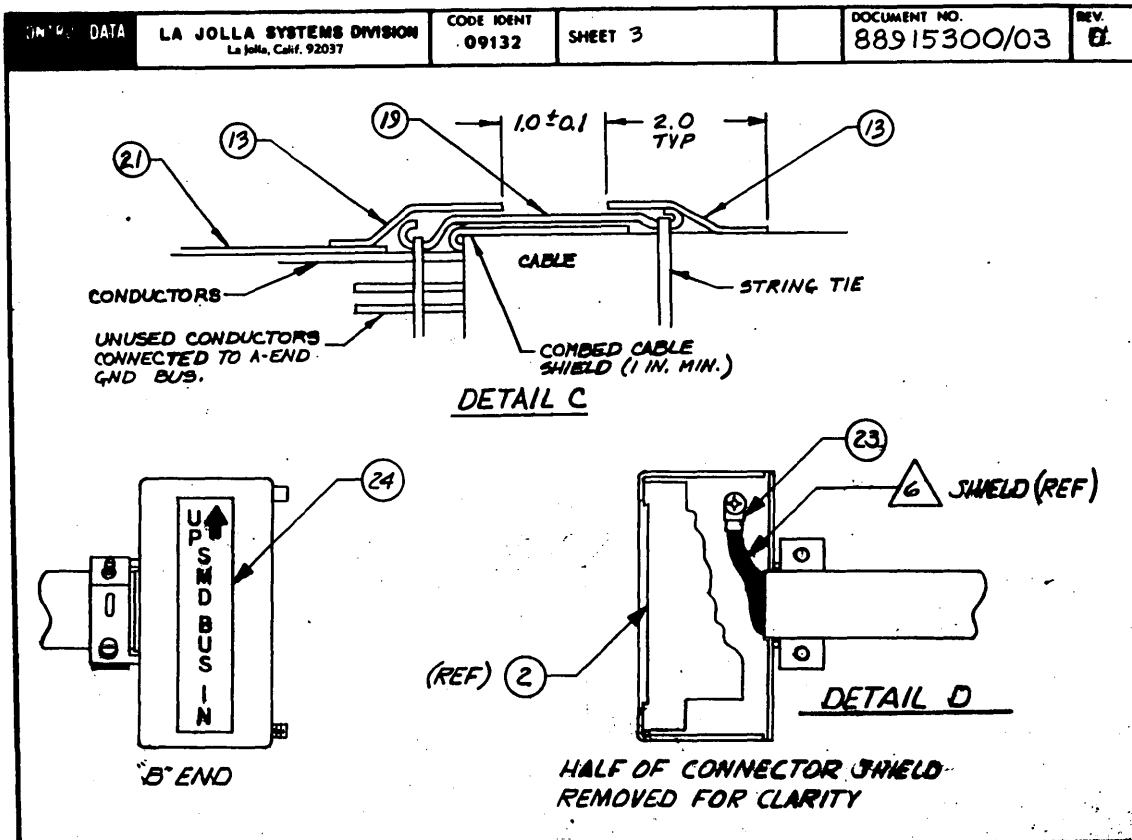


Figure 7-18. Cable Assembly - Disk Adapter to Control Unit Single CPU Bus In (Sheet 1 of 8)



CONTROL DATA					SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca. 92037		CODE IDENT 09132		SHEET 4		WL DOCUMENT NO. 88915300/03		REV. D	
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN	ACCESS FIND NO.	DESTINATION	ACCESS FIND NO.	REMARKS					
1	1	24	0	20FT	A END	4	10	B END	Y	7	TWISTED PAIR	TAG VALID		
2			9		A END GND		17		a		(TYP)	3		
3			2		A END	5	10		d				CHECK END	
4			9		A END GND		17		f					
5			4		A END	6	10		t				INDEX	
6			9		A END GND		17		v					
7			5		A END	7	10		c				NORMAL END	
8			9		A END GND		17		e					
9			6		A END	8	10		u				SECTOR	
10			9		A END GND		17		w					
11			90		A END	9	10		h				ALERT 0	
12			9		A END GND		17		k					
13			91		A END	10	10		j				ALERT 1	
14			9		A END GND		17		m					
15			92		A END	12	10		F				BUS IN 2	
16			9		A END GND		17		J					
17			93		A END	13	10		B				BUS IN 0	
18			9		A END GND		17		D					
19			94		A END	14	10		E				BUS IN 1	
20	1	24	9	20FT	A END GND		17	B END	H	7				

Figure 7-18. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 2 of 8)

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

88915300	D	CLA	A	CABLE ASSY-STORAGE MOD RUS IN	DSM	MP17	01/14/75	06/18/79	1 / 2
ASSEMBLY NUMBER	REV	CLASS	DW SZ	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	DW SZ	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	WH NC	S OR N
14	A	10125606	100	PC	PLAIN WASHERS	IN	014512	052676	PPP1	N	N
15	A	10125606	100	PC	PLAIN WASHERS	OUT	014719	111976	PPP1	N	N
16	A	10125607	100	PC	PLAIN WASHER No. 10	IN	014293	112475	PPP1	N	N
17	A	10125607	100	PC	PLAIN WASHER No. 10	OUT	014512	052676	PPP1	N	N
18	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1	N	N
19	A	10127122	100	PC	SCR MACH PAN PHL 8-32	IN	014512	052676	PPP1	N	N
20	A	10127142	100	PC	SCR MACH PAN PHL 10-32	IN	014293	112475	PPP1	N	N
21	A	10127142	100	PC	SCR MACH PAN PHL 10-32	OUT	014512	052676	PPP1	N	N
22	C	13497200	100	PC	TERMINAL, PRESSURE SCREW	OUT	014293	112475	PPP4	N	N
23	C	24501801	400	IN	WIRE ELECT SOLID COPPER 22 GA	IN	014719	111976	PPP1	N	N
24	C	24501809	600	IN	WIRE ELECT SOLID COPPER 18 GA	IN	014293	112475	PPP1	N	N
25	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	N
26	C	24502801	100	PC	SHIELD ELECT CONN 30 PIN	OUT	014719	111976	PPP4	N	N
27	C	24518001	26400	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	N
28	C	24534811	300	IN	SHIELD ELECT BRAIDED-BULK	IN	014293	112475	PPP4	N	N
29	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PPP4	N	N
30	C	25195010	800	IN	WIRE TEF INSUL 22AWG BLACK	OUT	014293	112475	PPP3	N	N
31	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	IN	014293	112475	PPP3	N	N
32	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	014719	111976	PPP3	N	N
33	A	25196921	1600	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN	014591	081776	PPP3	N	N
34	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PPP3	N	N
35	B	39183342	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4	N	N
36	B	39183344	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4	N	N
37	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4	N	N
38	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4	N	N
39	A	39397100	100	PC	LABEL, WRITE ON	OUT	014719	111976	PPP3	N	N
40	D	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N	N
41	D	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N	N
42	B	93645003	3800	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	N
43	C	94245609	2000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPP4	N	N
44	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4	N	N
45	C	94288101	200	PC	PIN ASSY, CORNER GUIDE	IN	014719	111976	PPP4	N	N
46	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N	N
47	B	94780401	100	PC	SCREWS, JACK	IN			PPP4	N	N
48	B	94780402	100	PC	SCREWS, JACK	IN			PPP4	N	N
49	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4	N	N

AA 2709-1 REV 7-74 SCMD INTERDIVISIONAL DOCUMENT

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

88915300	D	CLA	A	CABLE ASSY-STORAGE MOD RUS IN	DSM	MP17	01/14/75	06/18/79	2 / 2
ASSEMBLY NUMBER	REV	CLASS	DW SZ	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	DW SZ	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	WH NO.	C
22	A	96785700	100	PC	CLAMP U-TYPE .75 GAP	IN	014341	021076	PP24		
NUMBER OF LINE ITEMS = 37 HIGHEST FIND NUMBER = 24											

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

88915301	D	CLA	A	CABLE ASSY-STORAGE MOD	2US IN	DS	MP17	01/14/75	06/18/79	1 / 2
ASSEMBLY NUMBER	REV	CLASS	DWG REV	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE DATE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

SH.9
MF

PID NUMBER	DW 32	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH	MC	QTY
14	A	10125606	100	PC	PLAIN WASHERS	IN	014512	052676	PPP1			N
16	A	10125606	100	PC	PLAIN WASHERS	OUT	014719	111976	PPP1			N
16	A	10125607	100	PC	PLAIN WASHER No. 10	IN	014293	112475	PPP1			N
16	A	10125607	100	PC	PLAIN WASHER No. 10	OUT	014512	052676	PPP1			N
16	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1			N
15	A	10127122	100	PC	SCR MACH PAN PHL 8-32	IN	014512	052676	PPP1			N
15	A	10127142	100	PC	SCR MACH PAN PHL 10-32	IN	014293	112475	PPP1			N
15	A	10127142	100	PC	SCR MACH PAN PHL 10-32	OUT	014512	052676	PPP1			N
14	C	24307200	100	PC	TERMINAL PRESSURE SCREW	OUT	014293	112475	PPP4			N
17	C	24501801	400	IN	WIRE ELECT SOLID COPPER 22 GA	IN	014719	111976	PPP1			N
19	C	24501809	600	IN	WIRE ELECT SOLID COPPER 18 GA	IN	014293	112475	PPP1			N
2	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4			N
A	C	24502801	100	PC	SHIELD ELEC CONN 60 PIN	OUT	014719	111976	PPP4			N
1	C	24518001	38400	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4			N
19	C	24534811	300	IN	SHIELD ELEC BraidED-BULK	IN	014293	112475	PPP4			N
14	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PPP4			N
16	C	25195010	800	IN	WIRE TER INSUL 22AWG BLACK	OUT	014293	112475	PPP3			N
20	A	25196920	200	IN	INSUL SLEEVE SHIRINK 3/8 BLACK	IN	014293	112475	PPP3			N
20	A	25196920	300	IN	INSUL SLEEVE SHIRINK 3/8 BLACK	OUT	014719	111976	PPP3			N
21	A	25196921	1600	IN	INSUL SLEEVE SHIRINK 1/2 BLACK	IN	014591	081776	PPP3			N
13	A	25196922	600	IN	INSUL SLEEVE SHIRINK 3/4 BLACK	IN	014293	112475	PPP3			N
12	B	39183342	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4			N
24	B	39183344	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4			N
11	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4			N
A	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4			N
12	A	39397100	100	PC	LABEL WRITE ON	OUT	014719	111976	PPP3			N
3	D	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4			N
4	D	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4			N
7	B	93645003	3800	PC	CONTACT SOCKET SERIES .062	IN			PPP4			N
10	C	94245609	2000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPP4			N
3	C	94299100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4			N
4	C	94298101	200	PC	PIN ASSY, CORNER GUIDE	IN	014719	111976	PPP4			N
9	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4			N
6	B	94780401	100	PC	SCREWS, JACK	IN			PPP4			N
5	B	94780402	100	PC	SCREWS, JACK	IN			PPP4			N
23	A	96753526	100	PC	TERM SPACE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4			N

PROJECT ENGINEER

SCMD

AA 2709-1 REV. 7-75



ASSEMBLY PARTS LIST

SPARE CODE
S : SPARE PARTS
N : NON SPARE PARTS

89915301	D	CLA	A	CABLE ASSY-STORAGE W/D 2US 1Y	DS	WP17	01/14/75	05/18/79	2 / 2
ASSEMBLY NUMBER	REV	CLASS	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

SH. IC
MF

FIND NUMBER	DW ST	PART NUMBER	QUANTITY	UNIT MEAS	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PR NC	Q ON
22	A	96795700	100	PC	CLAMP U-TYPE .75 GAP	IN	014341	021076	PP24		N
NUMBER OF LINE ITEMS = 37 HIGHEST FIND NUMBER = 24											

PROJECT ENGINEER

SCM9

AA 2709-1 REV 7-75

Figure 7-18. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 5 of 8)

ASSEMBLY PARTS LIST

BR915302	D	CLA	A	CABLE ASSY-STORAGE MOD	AUS IN	DS	4017	01/14/75	06/18/79	1 / 2
ASSEMBLY NUMBER	REV	CLASS	OW SI	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

SH.11
MF

FIND NUMBER	DW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	NC
14	A	10125606	100	PC	PLAIN WASHERS	IN	014512	052676	PP01	
14	A	10125606	100	PC	PLAIN WASHERS	OUT	014719	111976	PP01	
16	A	10125607	100	PC	PLAIN WASHER No. 10	IN	014293	112475	PP01	
16	A	10125607	100	PC	PLAIN WASHER No. 10	OUT	014512	052676	PP01	
16	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PP01	
15	A	10127122	100	PC	SCR MACH PAN PNL 8-32	IN	014512	052676	PP01	
15	A	10127142	100	PC	SCR MACH PAN PNL 10-32	IN	014293	112475	PP01	
15	A	10127142	100	PC	SCR MACH PAN PNL 10-32	OUT	014512	052676	PP01	
17	C	13A87200	100	PC	TERMINAL, PRESSURE SCREW	OUT	014293	112475	PP01	
14	C	24501801	400	IN	WIRE ELECT SOLID COPPER 22 GA	IN	014719	111976	PP04	
14	C	24501809	600	IN	WIRE ELECT SOLID COPPER 18 GA	IN	014293	112475	PP01	
7	C	24502303	100	PC	CONN RECP ELEC 30 PIN	IN			PP04	
8	C	24503801	100	PC	SHIELD ELECT CONN 30 PIN	OUT	014719	111976	PP04	
1	C	24518001	50400	IN	CABLE ELEC 24 TWISTED PR	IN			PP04	
19	C	24534811	300	IN	SHIELD ELECT B&IDEN-BULK	IN	014293	112475	PP04	
14	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PP04	
16	C	25195013	800	IN	WIRE TEF INSUL 22AWG BLACK	OUT	014293	112475	PP03	
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	IN	014293	112475	PP03	
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	014719	111976	PP03	
21	A	25196921	1600	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN	014591	081776	PP03	
13	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PP03	
12	H	39183342	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PP04	
24	H	39183344	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PP04	
11	H	39296400	200	PC	LABEL, CABLE MARKING	IN			PP04	
8	H	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYEA	
10	A	39397100	100	PC	LABEL, WRITE ON	OUT	014719	111976	PP03	
3	D	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PP04	
6	D	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PP04	
7	H	93645003	3800	PC	CONTACT SOCKET SERIES .062	IN			PP04	
10	C	94245609	2000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PP04	
1	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PP04	
4	C	94288101	200	PC	PIN ASSY, CORNER GUIDE	IN	014719	111976	PP04	
9	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PP04	
6	H	94780401	100	PC	SCREWS, JACK	IN			PP04	
5	H	94780402	100	PC	SCREWS, JACK	IN			PP04	
23	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PP04	

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ASSEMBLY PARTS LIST

88015302	D	CLA	A	CABLE ASSY-STORAGE MOD	2US IN	DS	4P17	01/14/75	06/19/79	2 / 2
ASSEMBLY NUMBER	REV	CLASS	DW ST	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST ISSUE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

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FIND NUMBER	DW 92	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH NO.	Q
22	A	96795700	100	PC	CLAMP U-TYPE .75 GAP	IN	014341	021076	PPP4		N
					NUMBER OF LINE ITEMS = 37						
					HIGHEST FIND NUMBER = 24						

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Figure 7-18. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 6 of 8)

89915303	D	CLA	A	CABLE ASSY-STORAGE MOD RUS IN	05M	4017	01/14/75	06/18/79	1 / 2
ASSEMBLY NUMBER	REV	CLASS	DW SZ	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

SH.13
MF

FIND NUMBER	QTY	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT	CHANGE ORDER NUMBER	DATE	MAKE/BUY PART TYPE	PH	PC	QTY
14	A	10125606	100	PC	PLAIN WASHERS	IN	014512	052676	PPP1	N	N	N
15	A	10125606	100	PC	PLAIN WASHERS	OUT	014719	111976	PPP1	N	N	N
16	A	10125607	100	PC	PLAIN WASHER NO. 10	IN	014293	112475	PPP1	N	N	N
17	A	10125607	100	PC	PLAIN WASHER NO. 10	OUT	014512	052676	PPP1	N	N	N
18	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1	N	N	N
19	A	10127122	100	PC	SCR MACH PAN PHL 8-32	IN	014512	052676	PPP1	N	N	N
15	A	10127142	100	PC	SCR MACH PAN PHL 10-32	IN	014293	112475	PPP1	N	N	N
15	A	10127142	100	PC	SCR MACH PAN PHL 10-32	OUT	014512	052676	PPP1	N	N	N
14	C	13487200	100	PC	TERMINAL PREGROOVE SCREW	OUT	014293	112475	PPP4	N	N	N
17	C	24501801	400	IV	WIRE ELECT SOLTD COPPER 22 GA	IN	014719	111976	PPP1	N	N	N
19	C	24501809	600	IN	WIRE ELECT SOLTD COPPER 18 GA	IN	014293	112475	PPP1	N	N	N
2	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	N	N
2	C	24502801	100	PC	SHIELD ELECT CONN 50 PIN	OUT	014719	111976	PPP4	N	N	N
1	C	24513001	62400	IV	CABLE ELEC 24 TWISTED BR	IN			PPP4	N	N	N
19	C	24534811	300	IN	SHIELD ELECT BRAIDED-PUL	IN	014293	112475	PPP4	N	N	N
14	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PPP4	N	N	N
14	C	25196010	800	IN	WIRE TER INSUL 22AWG BLACK	OUT	014293	112475	PPP3	N	N	N
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PPP3	N	N	N
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/4 BLACK	OUT	014719	111976	PPP3	N	N	N
21	A	25196921	1600	IV	INSUL SLEEVE SHRINK 1/2 BLACK	IN	014591	081776	PPP3	N	N	N
13	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PPP3	N	N	N
12	B	39183342	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4	N	N	N
24	B	39183344	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4	N	N	N
11	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4	N	N	N
8	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4	N	N	N
12	A	39397100	100	PC	LABEL, WRITE ON	OUT	014719	111976	PPP3	N	N	N
3	B	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N	N	N
4	B	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4	N	N	N
7	B	93645003	3800	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	N	N
10	C	94245609	2000	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPP4	N	N	N
3	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4	N	N	N
9	C	9428A101	200	PC	PIN ASSY, CORNER GUIDE	IN	014719	111976	PPP4	N	N	N
4	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N	N	N
6	B	94780401	100	PC	SCREWS, JACK	IN			PPP4	N	N	N
5	B	94780402	100	PC	SCREWS, JACK	IN			PPP4	N	N	N
23	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4	N	N	N

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INTERDIVISIONAL DOCUMENT



ASSEMBLY PARTS LIST

SPARE CODE	
S	SPARE PARTS
N	NON SPARE PARTS

89015303	7	CLA	A	CABLE ASSY-STORAGE MOD	RUS TN	DSM	4P17	01/14/75	05/19/79	2/ 2
ASSEMBLY NUMBER	REV	CLASS	DW SL	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

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MF

FIND NUMBER	DW #2	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PR NC
22	A	967A5700	100	PC	CLAMP U-TYPE .75 GAL	IN	014341	021075	PDD4	N
					NUMBER OF LINE ITEMS = 37					
					HIGHEST FIND NUMBER = 24					

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INTERDIVISIONAL DOCUMENT

Figure 7-18. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 7 of 8)

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TABULATION			REVISION RECORD						
PART NO	LENGTH	TOL ±	REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
88915400	232 IN	2							
01	352 IN								
02	472 IN								
03	592 IN								

FOR REVISIONS SEE SH 15

④ STRIP BACK ENOUGH INSULATION TO BRAID APPROX 3 IN OF SHIELD AND CONNECT AS SHOWN IN DETAIL D.

⑤ AT "B" END OF CABLE, TIE BACK UNUSED WIRE PAIRS AND INSULATE WITH SHRINK SLEEVING.

4. BAG CABLE CLAMP (F/N 14), U-CLAMP (F/N 22), 8-32 SCREW (F/N 15), LOCK WASHERS (F/N 16) AND ATTACH TO CABLE.

③ WHT. WIRE OF EACH TWISTED PAIR & EACH UNUSED WIRE PAIR CONNECTED TO GND BUS (F/N 18) AT "A" END.

② USING F/N 17 CONNECT PINS 81, 102 & 302 TO CRIMP CONTACTS AND SOLDER. CONNECT TO F/N 18 USING SOLDER.

1. IDENTIFY CABLE PER ES 58876000.

INTER-DIVISIONAL DOCUMENT

Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.

DATE	TIME	BY	TITLE	CHECKED	DATE	TIME	BY
			CABLE ASSY-DISK ADAPTER TO CONTROL UNIT-SINGLE CPU-BUS OUT				

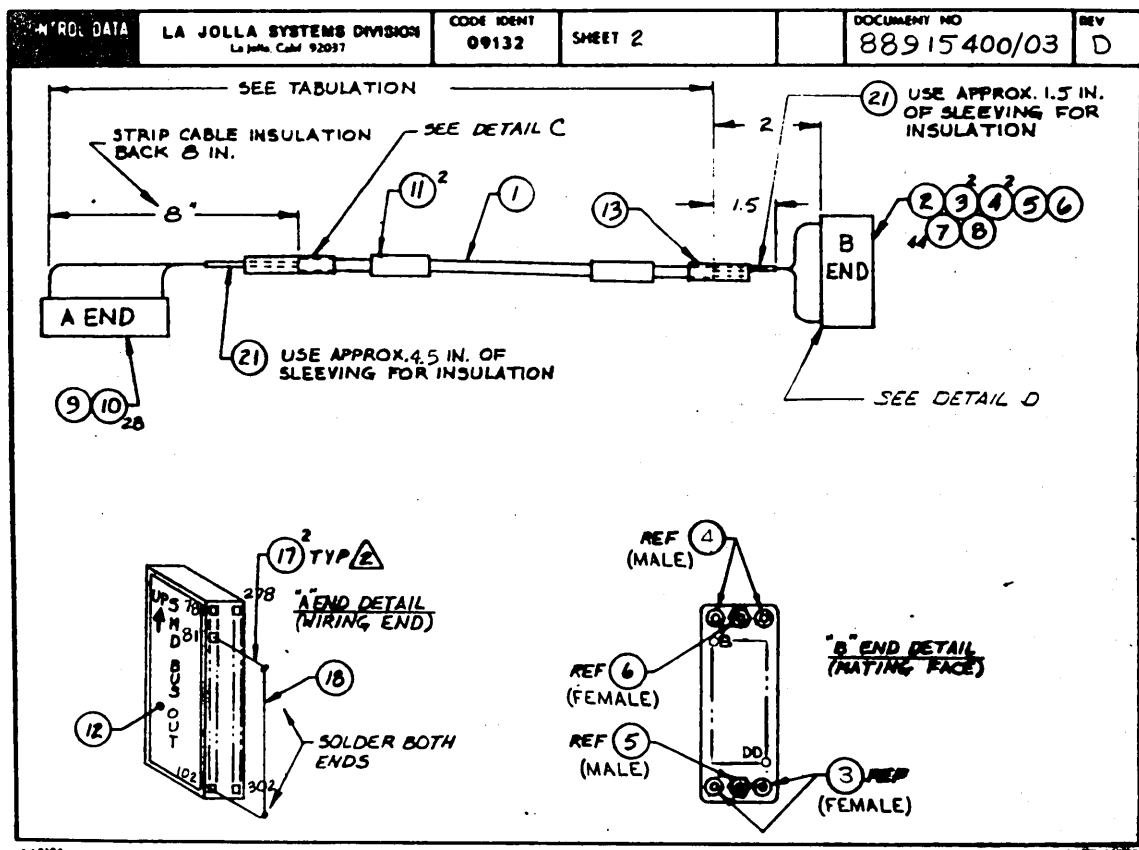
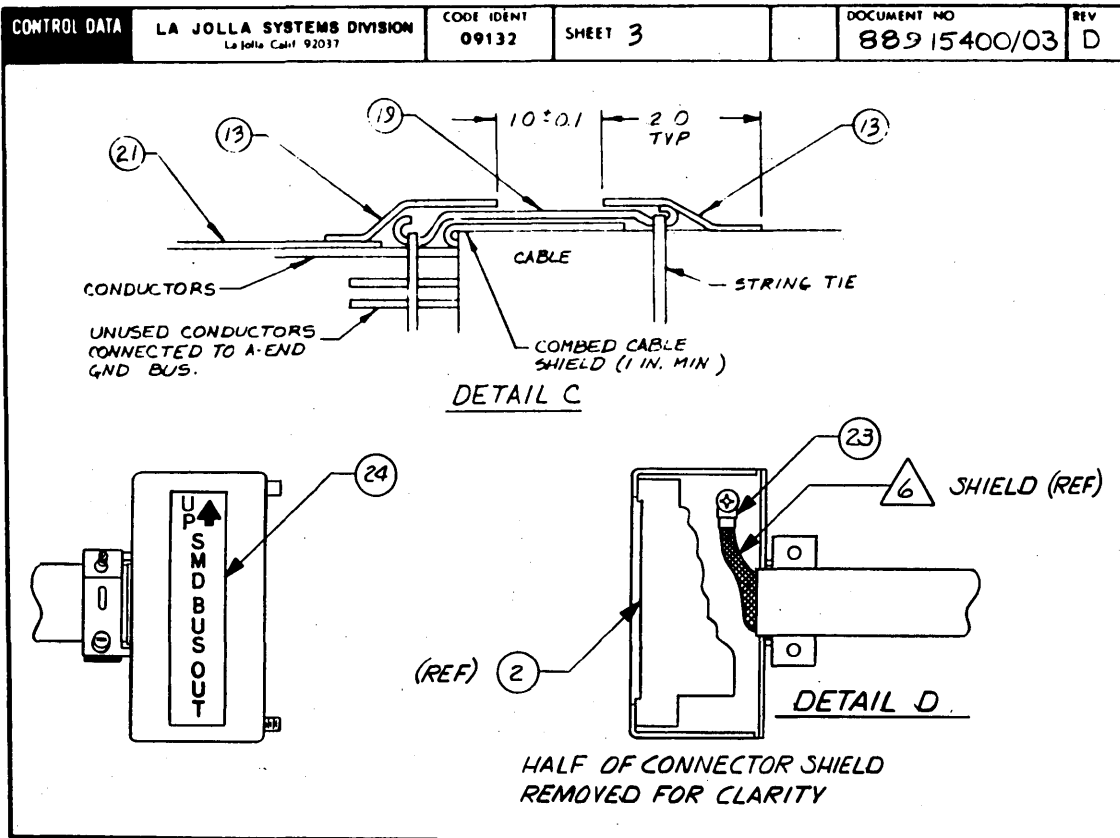


Figure 7-19. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 1 of 8)



CONTROL DATA			SMALL COMPUTER DEVELOPMENT DIVISION La Jolla, Ca 92037			CODE IDENT 09132		SHEET 4		WL		DOCUMENT NO 88915400/03		REV D	
CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS				
1	1	24	0	20FT	A END	83	10	B END	h	7	TW. PR.	TAG BUS 3			
2	↑	↑	9	↑	A END GND		17	↑	k	↑	(TYP)△				
3			2		A END	84	10		d			TAG BUS 2			
4			9		A END GND		17		p						
5			4		A END	85	10		c			TAG BUS 1			
6			9		A END GND		17		e						
7			5		A END	86	10		Z			TAG BUS 0			
8			9		A END GND		17		b						
9			6		A END	87	10		Y			BUS OUT P			
10			9		A END GND		17		a						
11			90		A END	88	10		u			RECYCLE			
12			9		A END GND		17		w						
13			91		A END	89	10		j			TAG BUS P			
14			9		A END GND		17		m						
15			92		A END	90	10		P			SYNC OUT			
16			9		A END GND		17		s						
17			93		A END	91	10		P			BUS OUT 4			
18			9		A END GND		17		S						
19	↓	↓	94	↓	A END	92	10	↓	U	↓		BUS OUT 6			
20	1	24	9	20FT	A END GND		17	B END	W	7					

UNCLASSIFIED

Figure 7-19. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 2 of 8)

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

89015401	D	CLA	A	CABLE ASSY-STORAGE MOD R115 OUT		DS	MP17	01/14/75	06/18/79	1 / 2	
ASSEMBLY NUMBER	REV	CLASS	DW	QT	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER	
FIND NUMBER	DW	QT	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PC NC
16	A	10125606		100	PC	PLAIN WASHERS	IN	014512	052676	PPP1	
16	A	10125606		100	PC	PLAIN WASHERS	OUT	014719	111976	PPP1	
16	A	10125607		100	PC	PLAIN WASHER NO. 10	IN	014293	112475	PPP1	
16	A	10125607		100	PC	PLAIN WASHER NO. 10	OUT	014512	052676	PPP1	
16	A	10125806		200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	111976	PPP1	
15	A	10127122		100	PC	SCR MACH PAN PHL 8-32	IN	014512	052676	PPP1	
15	A	10127142		100	PC	SCR MACH PAN PHL 10-32	IN	014293	112475	PPP1	
15	A	10127142		100	PC	SCR MACH PAN PHL 10-32	OUT	014512	052676	PPP1	
14	C	13687200		100	PC	TERMINAL PRESSURE SCREW	OUT	014293	112475	PPP4	
17	C	24501801		800	IN	WIRE ELECT SOLID COPPER 22 GA	IN	014293	112475	PPP1	
18	C	24501809		600	IN	WIRE ELECT SOLID COPPER 18 GA	IN	014293	112475	PPP1	
2	C	24502303		100	PC	CONN RECP ELEC 60 PIN	IN			PPP4	
1	C	24502801		100	PC	SHIELD ELECT CONN 50 PIN	OUT	014719	111976	PPP4	
1	C	24518001	36000	IN	CABLE ELEC 24 TWISTED PR	IN	014293	112475	PPP4		
19	C	24534811	300	IN	SHIELD ELECT BRAIDED-BULK	IN	014293	112475	PPP4		
14	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PPP4		
14	C	25105010	800	IN	WIRE TEF INSUL 22AWG BLACK	OUT	014293	112475	PPP3		
20	A	25106920	200	IN	INSUL SLEEVE SHRINK 3/8 BLACK	IN	014293	112475	PPP3		
20	A	25106920	200	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	014719	111976	PPP3		
21	A	25196921	600	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN	014591	081776	PPP3		
13	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PPP3		
12	B	39183343	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4		
24	B	39183345	100	PC	LABEL, CONN BLOCK	IN	014719	111976	PPP4		
11	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4		
8	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	111976	AYE4		
12	A	39307100	100	PC	LABEL, WRITE ON	OUT	014719	111976	PPP3		
3	D	93643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4		
4	D	93643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	111976	PPP4		
7	B	93645003	4200	PC	CONTACT SOCKET SERIES .062	IN			PPP4		
10	C	94245609	2200	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPP4		
3	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4		
4	C	94288101	200	PC	PIN ASSY, CORNER GUIDE	IN	014719	111976	PPP4		
9	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4		
4	B	94780401	100	PC	SCREWS, JACK	IN			PPP4		
5	B	94780402	100	PC	SCREWS, JACK	IN			PPP4		
23	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	111976	PPP4		

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ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

89015401	D	CLA	A	CABLE ASSY-STORAGE MOD R115 OUT		DS	MP17	01/14/75	05/18/79	2/ 2
ASSEMBLY NUMBER	REV	CLASS	DW	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER
32										

FIND NUMBER	DW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PC NC
22	A	96795700	100	PC	CLAMP U-TYPE .75 GAD	IN	014341	021076	PPP4	

NUMBER OF LINE ITEMS = 37	
HIGHEST FIND NUMBER = 24	

NUMBER OF LINE ITEMS = 37
HIGHEST FIND NUMBER = 24

PROJECT ENGINEER SCMD

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Figure 7-19. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 5 of 8)

BRQ15402		REV	CLASS	A	CABLE ASSY-STORAGE MOD R115 OUT		CS	4P17	01/14/75	06/18/79	1 / 2
ASSEMBLY NUMBER		REV	CLASS	DW #1	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER
P/NO NUMBER	DW #2	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION		IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY	PG. NO.
1A	10125604	100	PC		PLAIN WASHERS		IN	014512	052676	PPP1	N
1A	10125606	100	PC		PLAIN WASHERS		OUT	014719	111976	PPP1	N
1A	10125607	100	PC		PLAIN WASHER NO. 10		IN	014293	112475	PPP1	N
1A	10125607	100	PC		PLAIN WASHER NO. 10		OUT	014512	052676	PPP1	N
1A	10125806	200	PC		SPRING LOCK WASHERS (MED.)		IN	014719	111976	PPP1	N
1A	10127122	100	PC		SCR MACH PAN PH 9-32		IN	014512	052676	PPP1	N
1A	10127142	100	PC		SCR MACH PAN PH 10-32		IN	014293	112475	PPP1	N
1A	10127142	100	PC		SCR MACH PAN PH 10-32		OUT	014512	052676	PPP1	N
1A	13467200	100	PC		TERMINAL PRESSURE SCREW		OUT	014293	112475	PPP4	N
17	24501801	900	IN		WIPE ELECT SOLTIN COPPER 22 GA		IN	014293	112475	PPP1	N
18	24501809	600	IN		WIPE ELECT SOLTIN COPPER 18 GA		IN	014293	112475	PPP1	N
2	24502303	100	PC		CONN RECP ELEC 50 PIN		IN			PPP4	N
2	24502801	100	PC		SHIELD ELEC GAN 50 PIN		OUT	014719	111976	PPP4	N
1	24519001	48000	IN		CABLE ELEC 24 TWISTED P2		IN	014293	112475	PPP4	N
10	24534811	300	IN		SHIELD ELEC 80AIDFG-BULK		IN	014293	112475	PPP4	N
14	24565009	100	PC		CABLE CABLE NYLON 5/8 DTA		IN	014293	112475	PPP4	N
14	25105910	800	IN		WIPE TEF INSUL 24AWG BLACK		OUT	014293	112475	PPP3	N
20	25106920	300	IN		INSUL SLEEVE SWINK 3/4 BLACK		IN	014293	112475	PPP3	N
20	25106920	300	IN		INSUL SLEEVE SWINK 3/4 BLACK		OUT	014719	111976	PPP3	N
21	25106921	600	IN		INSUL SLEEVE SWINK 1/2 BLACK		IN	014591	081776	PPP3	N
13	25106922	600	IN		INSUL SLEEVE SWINK 3/4 BLACK		IN	014293	112475	PPP3	N
12	39183343	100	PC		LABEL, CONN BLACK		IN	014719	111976	PPP4	N
24	39183345	100	PC		LABEL, CONN BLACK		IN	014719	111976	PPP4	N
11	39206400	200	PC		LABEL, CABLE MARKING		IN			PPP4	N
9	39349900	100	PC		SHIELD MODIFICATION-50PIN CONN		IN	014719	111976	AYE4	N
12	39397100	100	PC		LABEL, WHITE ON		OUT	014719	111976	PPP3	N
0	93643804	200	PC		CONNECTOR (34 PIN)		OUT	014719	111976	PPP4	N
0	93643805	200	PC		CONNECTOR (34 PIN)		OUT	014719	111976	PPP4	N
7	93645003	4200	PC		CONTACT SOCKET SERIES .062		IN			PPP4	N
10	94245609	2200	PC		CONTACT-CRIMP, INSERT, SOCKET		IN			PPP4	N
3	94249100	200	PC		ACCESSORIES-CONNECTOR		IN	014719	111976	PPP4	N
4	94249101	200	PC		PIN ASSY-CORNER GUIDE		IN	014719	111976	PPP4	N
9	943A0805	100	PC		HOUSING-CORNER SOCKET .125 50CAV		IN			PPP4	N
6	94780401	100	PC		SCREWS, JACK		IN			PPP4	N
5	94781402	100	PC		SCREWS, JACK		IN			PPP4	N
23	96753526	100	PC		TERM SDADE SPRNG 12-10AWG NO 5		IN	014719	111976	PPP4	N
PROJECT ENGINEER											
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SH. 11
MF

89015402		0	CLA	A CABLE ASSY-STORAGE MOD RJS OUT		05	4P17	01/14/75	06/18/79	2/ 2
ASSEMBLY NUMBER		REV	CLASS	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

FIND NUMBER	DN SZ	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH NC	PH NC
22	A	96785700	100	PC	CLAMP U-TYPE .75 GAP	IN	014341	021076	PPP4		
					NUMBER OF LINE ITEMS = 37						
					HIGHEST FIND NUMBER = 24						

PROJECT ENGINEER

SCMD

AA 3708-1 REV 7-78

SH. 12
MF

Figure 7-19. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 6 of 8)

ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

88915403	0	CLA	A	CABLE ASSY-STORAGE MOD RUS OUT	DSM	MP17	01/14/75	06/18/79	1 / 1
ASSEMBLY NUMBER	REV	CLASS	DW SZ	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING DATE	PAGE NUMBER

SH.13
MF

FIND NUMBER	DW #2	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MARKS/BUY PART TYPE	PH NC
16	A	10125606	100	PC	PLAIN WASHERS	IN	014512	052676	PPP1	N
16	A	10125606	100	PC	PLAIN WASHERS	OUT	014719	112976	PPP1	N
16	A	10125607	100	PC	PLAIN WASHER NO. 10	IN	014293	112475	PPP1	N
16	A	10125607	100	PC	PLAIN WASHER NO. 10	OUT	014512	052676	PPP1	N
16	A	10125806	200	PC	SPRING LOCK WASHERS (MED.)	IN	014719	112976	PPP1	N
15	A	10127122	100	PC	SCR MACH PAN PNL 8-32	IN	014512	052676	PPP1	N
15	A	10127142	100	PC	SCR MACH PAN PNL 10-32	IN	014293	112475	PPP1	N
15	A	10127142	100	PC	SCR MACH PAN PNL 10-32	OUT	014512	052676	PPP1	N
14	C	13407200	100	PC	TERMINAL PRESSURE SCREW	OUT	014293	112475	PPP4	N
17	C	24501801	800	IN	WIRE ELECT SOLTN COPPER 22 GA	IN	014293	112475	PPP1	N
14	C	24501809	600	IN	WIRE ELECT SOLTN COPPER 18 GA	IN	014293	112475	PPP1	N
2	C	24502303	100	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N
9	C	24502801	100	PC	SHIELD ELEC CTN 50 PIN	OUT	014719	112976	PPP4	N
1	C	24518001	60000	IN	CABLE ELEC 24 TWISTED PR	IN	014293	112475	PPP4	N
19	C	24534811	300	IN	SHIELD ELEC BRAIDED-BULK	IN	014293	112475	PPP4	N
14	C	24565009	100	PC	CLAMP CABLE NYLON 5/8 DIA	IN	014293	112475	PPP4	N
14	C	25195010	800	IN	WIRE TEE INSUL 22AWG BLACK	OUT	014293	112475	PPP3	N
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	IN	014293	112475	PPP3	N
20	A	25196920	300	IN	INSUL SLEEVE SHRINK 3/8 BLACK	OUT	014719	112976	PPP3	N
21	A	25196921	600	IN	INSUL SLEEVE SHRINK 1/2 BLACK	IN	014591	082976	PPP3	N
13	A	25196922	600	IN	INSUL SLEEVE SHRINK 3/4 BLACK	IN	014293	112475	PPP3	N
12	B	39183343	100	PC	LABEL, CONN BLOCK	IN	014719	112976	PPP4	N
24	B	39183345	100	PC	LABEL, CONN BLOCK	IN	014719	112976	PPP4	N
11	B	39296400	200	PC	LABEL, CABLE MARKING	IN			PPP4	N
9	B	39348900	100	PC	SHIELD MODIFICATION-50PIN CONN	IN	014719	112976	AYE4	N
12	A	39397100	100	PC	LABEL, WRITE ON	OUT	014719	112976	PPP3	N
9	D	92643004	200	PC	CONNECTOR (34 PIN)	OUT	014719	112976	PPP4	N
6	D	92643005	200	PC	CONNECTOR (34 PIN)	OUT	014719	112976	PPP4	N
7	B	93645003	4200	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N
10	C	94245609	2200	PC	CONTACT-CRIMP, INSERT, SOCKET	IN			PPP4	N
3	C	94288100	200	PC	ACCESSORIES- CONNECTOR	IN	014719	111976	PPP4	N
4	C	94288101	200	PC	PIN ASSY-CORNER GUIDE	IN	014719	111976	PPP4	N
9	C	94360805	100	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N
6	B	94780401	100	PC	SCREWS, JACK	IN			PPP4	N
5	B	94780402	100	PC	SCREWS, JACK	IN			PPP4	N
23	A	96753526	100	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN	014719	112976	PPP4	N

AA 2709-1 REV. 7-75



ASSEMBLY PARTS LIST

SPARE CODE
S = SPARE PARTS
N = NON SPARE PARTS

89015403	D	CLA	A	CABLE ASSY-STORAGE MOD 9:15 UNIT	75M	WP17	01/14/75	06/18/79	2/ 2
ASSEMBLY NUMBER	REV	CLASS	QW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	PROCESSING NUMBER	PAGE NUMBER

SH. 14
MF

FIND NUMBER	DR P L	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/OUT PART TYPE	PH MC	Q
22	A	96795700	100	PC	CLAMP U-TYPE .75 GAP	IN	014341	021076	PPP4		N
					NUMBER OF LINE ITEMS = 37						
					HIGHEST FIND NUMBER = 24						

AA 2709-1 REV 7-75

SCMD

INTERDIVISIONAL DOCUMENT

Figure 7-19. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 7 of 8)

PART NO.	LENGTH	TOL.
96721490	240 IN.	6 IN.
91	360 IN.	6 IN.
92	480 IN.	6 IN.
93	600 IN.	12 IN.

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
A	DS19107	CL A. RELEASED	AW	9-2-79	AW	AW
B	DS22027	ADDED NOTE 10 & TABLE 1	CB	9-2-79	AW	AW

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.		DWN CHKD ENG MFG APP	9/4/79 9-7-79 9-7-79 9-16-79 9-26-79	DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	TITLE CABLE ASSY-DISK ADAPTER TO CONTROL UNIT-SINGLE CPU-BUS IN	CODE IDENT 09132	DWG NO 96721490/94	SCALE 96721443	SHEET 1 OF 12
--	--	----------------------------------	--	--	--	---------------------	-----------------------	-------------------	---------------

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	SHEET 2	DOCUMENT NO 96721490/94	REV B
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NOTES:

- 1 IDENTIFY CABLE PER CDC STD 1.30.008 WITH MFG FACILITY CODE.
- 2 SOLDER INDIVIDUAL 1IN. PIECES OF F/N 1 TO CRIMP CONTACTS (F/N 15) AND INSERT IN CAVITIES 3 & 25. THEN SOLDER ON GROUND BUS (F/N 2).
- 3 AT "A" END SOLDER WHT WIRE OF EACH TWISTED PAIR & ALL UNUSED PAIRS TO GROUND BUS (F/N 2).
4. BAG U-CLAMP (F/N 24) AND ATTACH TO CABLE.
- 5 AT "B" END, SOLDER UNUSED WIRES TOGETHER AND SLEEVE WITH F/N 6.
- 6 AT "B" END, STRIP BACK 2.5 IN. OF INSULATION, TWIST APPROX 2.5 IN. OF SHIELD, SLEEVE WITH 2.25 IN. OF F/N 5 AND CONNECT AS SHOWN IN DETAIL C.
- 7 FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS (F/N 15).
- 8 FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS (F/N 14).
- 9 FOLD END OF BRAIDED SLEEVING (F/N 22) INWARD TO FORM FISHMOUTH. FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE (F/N 16). THEN FORM FISHMOUTH AT OTHER END, STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
- 10 UNLESS OTHERWISE SPECIFIED, ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1

Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 1 of 6)

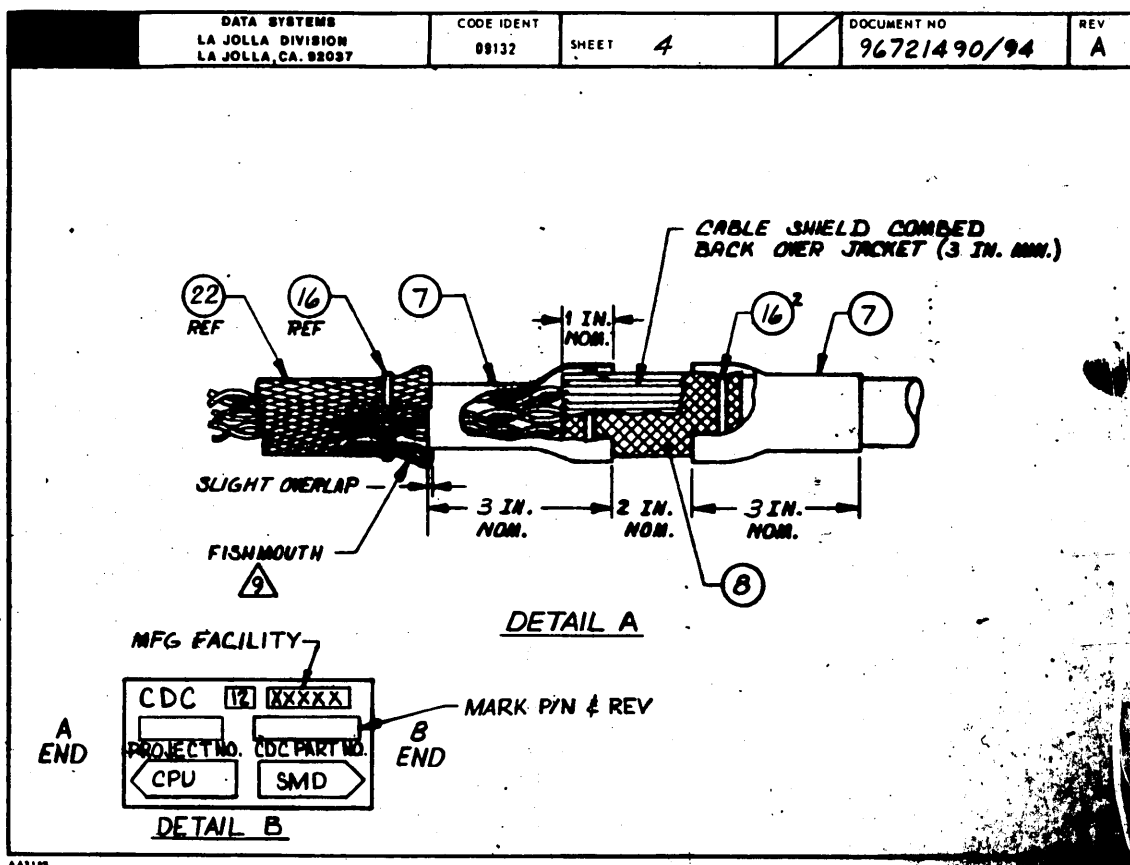
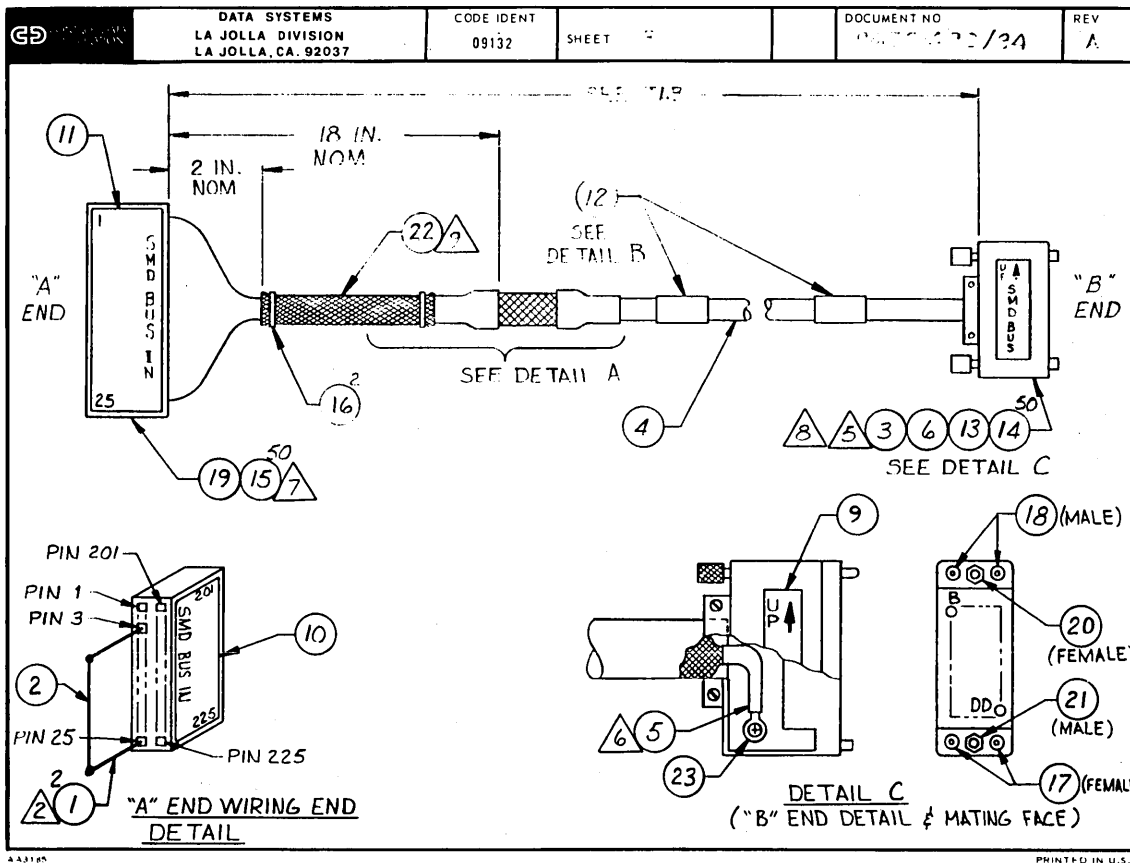


Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
 Single CPU Bus In (Sheet 2 of 6)

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037		CODE IDENT 09132	SHEET 5	DOCUMENT NO 96721490/94	REV B
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NOMINAL DIMENSION TOL TABLE	
(DIM INCHES)	TOL (INCHES)
0.5 TO 5.99	-0 +0.5
6.0 THRU 12.99	-0 + 1.0
13.0 THRU 48.99	-0 + 2.0
49.0 THRU 96.99	-0 + 4.0
97.0 & UP	-0 + 5.0

TABLE 1

AA21B

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DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA 92037				CODE IDENT 09132	SHEET 6	WL	DOCUMENT NO 96721490/94	REV B
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CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN	ACCESS FIND NO	DESTINATION	ACCESS FIND NO	REMARKS			
1	4	24	0	SEE TAB	A END	4	15	B END	Y	14	TW PAIR TAG VALID (TYP)	
2	↑	↑	9	↑	↑	GND	3	2	↑	a		↑
3	↑	↑	2	↑	↑	5	15	↑	↑	d	↑	CHECK END
4	↑	↑	9	↑	↑	GND	3	2	↑	f	↑	
5	↑	↑	4	↑	↑	6	15	↑	↑	t	↑	INDEX
6	↑	↑	9	↑	↑	GND	3	2	↑	v	↑	
7	↑	↑	5	↑	↑	7	15	↑	↑	c	↑	NORMAL END
8	↑	↑	9	↑	↑	GND	3	2	↑	e	↑	
9	↑	↑	6	↑	↑	8	15	↑	↑	u	↑	SECTOR
10	↑	↑	9	↑	↑	GND	3	2	↑	w	↑	
11	↑	↑	90	↑	↑	9	15	↑	↑	h	↑	ALERT 0
12	↑	↑	9	↑	↑	GND	3	2	↑	k	↑	
13	↑	↑	91	↑	↑	10	15	↑	↑	j	↑	ALERT 1
14	↑	↑	9	↑	↑	GND	3	2	↑	m	↑	
15	↑	↑	92	↑	↑	12	15	↑	↑	F	↑	BUS IN 2
16	↑	↑	9	↑	↑	GND	3	2	↑	J	↑	
17	↑	↑	93	↑	↑	13	15	↑	↑	B	↑	BUS IN 0
18	↑	↑	9	↑	↑	GND	3	2	↑	D	↑	
19	↓	↓	94	↓	↓	14	15	↓	↓	E	↓	BUS IN 1
20	4	24	9	SEE TAB	A END GND	3	2	B END	H	14		

PRINTED IN U.S.A.

Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 3 of 6)

CONDUCTOR IDENT		FIND NO	GAUGE REF	COLOR (REF)	LENGTH (APPROX)	ORIGIN	ACCESS FIND NO	DESTINATION	ACCESS FIND NO	REMARKS	
21	4	24	95	SEE TAB A	END	15	15	B END	K	14	TW PAIR BUS IN 3
22	▲	▲	9	▲	▲	GND	3	▲	M	▲	(TYP)
23			96				17		R		BUS IN 6
24			9			GND	3		T		
25			97				18		U		BUS IN 7
26			9			GND	3		W		
27			98				19		A		SEL ACT IN
28			9			GND	3		C		
29			900				21		V		BUS IN P
30			9			GND	3		X		
31			910				22		P		BUS IN 5
32			9			GND	3		S		
33			920				23		L		BUS IN 4
34			9			GND	3		N		
35			930				24		Z		SYNC IN
36			9			GND	3		b	14	
37			940			GND	3			5	UNUSED
38			9			GND	3			5	▲
39	▼	▼	950	▼	▼	GND	3	▼		5	▼
40	4	24	9	SEE TAB A	END	GND	3	B END		5	UNUSED

[illegible]

Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 4 of 6)

ASSEMBLY PARTS LIST

8-70

96721490	R	A	A	CABLE ASSY-STORAGE MOD BUS IN	DSM	YA127R	09/22/79	022027	12/03/80	11	MF
ASSEMBLY NUMBER	REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	

FIND NUMBER	OW	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH	OW
1	C	24501F01	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	
2	C	24501A09	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	
3	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	2451A001	244.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
5	C	2452P617	2.25	IN	INS SLEEVING, ELEC-BULK	IN			PPP3	N	
6	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 BLK BULK	IN			PPP4	N	
7	C	24534714	6.00	IN	SHRINK SLEEVE 3/4 BLK BULK	IN			PPP1	N	
8	C	24534811	5.00	IN	SHIELD ELECT BRAIDED-BULK	IN			PPP4	N	
9	R	39183344	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
10	R	39183377	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
11	R	39183378	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
12	R	39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	R	39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	R	93645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
15	C	94245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
16	C	94277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N	
17	C	94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N	
18	C	94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N	
19	C	94360805	1.00	PC	HOUSING-CONN,SOCKET .125 50CAV	IN			PPP4	N	
20	R	94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	R	94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	95048801	16.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 24
HIGHEST FIND NUMBER = 24

SCMD MFG INFO

INTERDIVISIONAL DOCUMENT

ASSEMBLY PARTS LIST

8-70

96721491	R	A	A	CABLE ASSY-STORAGE MOD BUS IN	DSM	YA127R	09/22/79	022027	12/03/80	11	MF
ASSEMBLY NUMBER	REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	

FIND NUMBER	OW	PART NUMBER	QUANTITY	UNIT	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAKE/BUY PART TYPE	PH	OW
1	C	24501A01	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	
2	C	24501A09	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	
3	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	2451A001	364.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
5	C	2452P617	2.25	IN	INS SLEEVING, ELEC-BULK	IN			PPP3	N	
6	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 BLK BULK	IN			PPP4	N	
7	C	24534714	6.00	IN	SHRINK SLEEVE 3/4 BLK BULK	IN			PPP1	N	
8	C	24534811	5.00	IN	SHIELD ELECT BRAIDED-BULK	IN			PPP4	N	
9	R	39183344	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
10	R	39183377	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
11	R	39183378	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
12	R	39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	R	39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	R	93645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
15	C	94245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
16	C	94277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N	
17	C	94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N	
18	C	94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N	
19	C	94360805	1.00	PC	HOUSING-CONN,SOCKET .125 50CAV	IN			PPP4	N	
20	R	94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	R	94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	95048801	16.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 24
HIGHEST FIND NUMBER = 24

SCMD MFG INFO

INTERDIVISIONAL DOCUMENT

Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 5 of 6)

ASSEMBLY PARTS LIST

SHT 11

96721492		REV	CL	OW	SE	CABLE ASSY-STOPAGE MOD BUS IN	DSM	YA1273	09/22/79	022027	12/03/80	11	MF
ASSEMBLY DESCRIPTION		REV	CL	OW	SE	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	

FIND NUMBER	OW SE	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAN/INT PART TYPE	PN NG	OW SE
1	C	24501P01	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	
2	C	24501P09	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	
3	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	2451R001	484.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
5	C	2452P617	2.25	IN	INS SLEEVING, ELEC-BULK	IN			PPP3	N	
6	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 BLK BULK	IN			PPP4	N	
7	C	24534714	6.00	IN	SHRINK SLEEVE 3/4 BLK BULK	IN			PPP1	N	
8	C	24534P11	5.00	IN	SHIELD ELECT BRAIDED-BULK	IN			PPP4	N	
9	R	39183344	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
10	R	39183377	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
11	R	39183378	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N	
12	R	39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	R	39344900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	R	93645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
15	C	94245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
16	C	94277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N	
17	C	94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N	
18	C	94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N	
19	C	94360805	1.00	PC	HOUSING-CONN,SOCKET .125 50CAV	IN			PPP4	N	
20	R	94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	R	94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	95048801	16.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	967P5700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 24

HIGHEST FIND NUMBER = 24

SCMD MFG INFO

INTERDIVISIONAL DOCUMENT

ASSEMBLY PARTS LIST

SHT 12

96721493		R	A	CARLE ASSY-STOPAGE MOD BUS IN			DSM	YA127B	09/22/79	022027	12/03/80	11 MF		
ASSEMBLY NUMBER		REV	CL	OW	SE	ASSEMBLY DESCRIPTION		DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER	
FIND NUMBER	OW SE	PART NUMBER		QUANTITY	UNIT MEAS.	PART DESCRIPTION			IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	MAN/INT PART TYPE	PN NG	OW SE
1	C	24501P01		2.00	IN	WIRE ELECT SOLID COPPER 22 GA			IN			PPP1	N	
2	C	24501P09		3.00	IN	WIRE ELECT SOLID COPPER 18 GA			IN			PPP1	N	
3	C	24502303		1.00	PC	CONN RECP ELEC 50 PIN			IN			PPP4	N	
4	C	2451R001		604.00	IN	CABL ELEC 24 TWISTED PR			IN			PPP4	N	
5	C	2452P617		2.25	IN	INS SLEEVING, ELEC-BULK			IN			PPP3	N	
6	C	24534710		2.00	IN	SHRINK SLEEVE 3/8 BLK BULK			IN			PPP4	N	
7	C	24534714		6.00	IN	SHRINK SLEEVE 3/4 BLK BULK			IN			PPP1	N	
8	C	24534P11		5.00	IN	SHIELD ELECT BRAIDED-BULK			IN			PPP4	N	
9	R	39183344		1.00	PC	LABEL, CONN BLOCK			IN			PPP4	N	
10	R	39183377		1.00	PC	LABEL, CONN BLOCK			IN			PPP4	N	
11	R	39183378		1.00	PC	LABEL, CONN BLOCK			IN			PPP4	N	
12	R	39296400		2.00	PC	LAREL, CARLE MARKING			IN			PPP4	N	
13	R	39344900		1.00	PC	SHIELD MODIFICATION-50PIN CONN			IN			AYE4	N	
14	R	93645003		50.00	PC	CONTACT SOCKET SERIES .062			IN			PPP4	N	
15	C	94245601		50.00	PC	CONTACT-CRIMP INSERT SOCKET			IN			PPP4	N	
16	C	94277400		4.00	PC	STRAP CABLE TIE			IN			PPP4	N	
17	C	94288100		2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE			IN			PPP4	N	
18	C	94288101		2.00	PC	PIN ASSY,CORNER GUIDE-MALE			IN			PPP4	N	
19	C	94360805		1.00	PC	HOUSING-CONN,SOCKET .125 50CAV			IN			PPP4	N	
20	R	94780401		1.00	PC	SCREW-JACK-FEMALE			IN			PPP4	N	
21	R	94780402		1.00	PC	SCREW-JACK-MALE			IN			PPP4	N	
22	A	95048801		16.00	IN	SLEEVING-BRAIDED 1/2.IN			IN			PPP3	N	
23	A	96753526		1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6			IN			PPP4	N	
24	A	967P5700		1.00	PC	CLAMP,U-TYPE .75 GAPX1.25			IN			PPP4	N	
NUMBER OF LINE ITEMS = 24														
HIGHEST FIND NUMBER = 24														

SCMD MFG INFO

INTERDIVISIONAL DOCUMENT

Figure 7-20. Cable Assembly - Disk Adapter to Control Unit
Single CPU Bus In (Sheet 6 of 6)

TABULATION			REVISION RECORD						
PART NO.	LENGTH	TOL ±	REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
96721495	240 IN.	6 IN.	A	DS 19/97	CL A. RELEASED	BR	9-26-79	AW	AW
96	360 IN.	6 IN.	B	DS22027	ADDED NOTE 10 & TABLE 1	KB	12-16-80	AW	AW
97	480 IN.	6 IN.							
98	600 IN.	12 IN.							

INTER-DIVISIONAL DOCUMENT Changes to this document require approval of all Using Divisions per CDC-STD 1.01.024.	DWN	9-7-79	 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	TITLE	CODE IDENT	DWG NO	
	CHKD	9-7-79		 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CABLE ASSY-DISK ADAPTER TO	A	96721495/99
	ENG	9-7-79			CONTROL UNIT-SINGLE CPU-BUS OUT		
	MFG	9-19-79					
	APP	9-26-79					
			SCALE	96721443	SHEET 1 OF 12		

 DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	SHEET 2	DOCUMENT NO 96721495/99	REV. B
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NOTES:

- ① IDENTIFY CABLE PER CDC STD 1.30.008 WITH MFG FACILITY CODE.
- ② SOLDER INDIVIDUAL 1 IN. PIECES OF F/N 1 TO CRIMP CONTACTS (F/N 15) AND INSERT IN CAVITIES 81 & 102. THEN SOLDER ON GROUND BUS (F/N 2).
- ③ AT "A" END SOLDER WHT WIRE OF EACH TWISTED PAIR & ALL UNUSED PAIRS TO GROUND BUS (F/N 2).
4. BAG U-CLAMP (F/N 24) AND ATTACH TO CABLE.
- ⑤ AT "B" END, SOLDER UNUSED WIRES TOGETHER AND SLEEVE WITH F/N 6.
- ⑥ AT "B" END, STRIP BACK 2.5 IN. OF INSULATION, TWIST APPROX 2.5 IN. OF SHIELD, SLEEVE WITH 2.25 IN. OF F/N 5 AND CONNECT AS SHOWN IN DETAIL C.
- ⑦ FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS (F/N 15).
- ⑧ FILL ALL UNUSED CAVITIES WITH CRIMPED CONTACTS (F/N 14).
- ⑨ FOLD END OF BRAIDED SLEEVING (F/N 22) INWARD TO FORM FISHMOUTH. FASTEN THIS END CLOSE TO SHRINK SLEEVING WITH CABLE TIE (F/N 16). THEN FORM FISHMOUTH AT OTHER END, STRETCH AND SMOOTH THE SLEEVING DOWN ITS ENTIRE LENGTH TOWARDS THE "A" END. BEFORE TIE WRAPPING THAT END, CHECK FOR 2 INCH SPACING AND ADJUST AS NECESSARY THE AMOUNT OF SLEEVING FOLDED INTO THE FISHMOUTH.
- ⑩ UNLESS OTHERWISE SPECIFIED, ALL NOMINAL DIMENSIONS COMPLY WITH TABLE 1.

Figure 7-21. Cable Assembly Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 1 of 6)



60475800 C

DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037	CODE IDENT 09132	SHEET 5	DOCUMENT NO 96721495/99	REV B
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NOMINAL DIMENSION TOL TABLE

(DIM INCHES)	TOL (INCHES)
0.5 TO 5.99	-0 +0.5
6.0 THRU 12.99	-0 +1.0
13.0 THRU 48.99	-0 +2.0
49.0 THRU 96.99	-0 +4.0
97.0 & UP	-0 +5.0

TABLE 1

AA3183
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		DATA SYSTEMS LA JOLLA DIVISION LA JOLLA, CA. 92037				CODE IDENT 09132		SHEET 6		WL		DOCUMENT NO 96721495/99		REV B	
		CONDUCTOR IDENT.	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO	REMARKS		
1	4	24	0	SEE TAB	A	END	83	15	B	END	h	14	TW PAIR (TYP)	TAG BUS 3	
2	↑	↑	9	↑	↑	GND	3	2	↑	k	↑				
3			2				84	15			d			TAG BUS 2	
4			9			GND	3	2			f				
5			4				85	15			c			TAG BUS 1	
6			9			GND	3	2			e				
7			5				86	15			Z			TAG BUS 0	
8			9			GND	3	2			b				
9			6				87	15			Y			BUS OUT P	
10			9			GND	3	2			a				
11			90				88	15			u			RECYCLE	
12			9			GND	3	2			w				
13			91				89	15			j			TAG BUS P	
14			9			GND	3	2			m				
15			92				90	15			p			SYNC OUT	
16			9			GND	3	2			s				
17			93				91	15			P			BUS OUT 4	
18			9			GND	3	2			S				
19	↓	↓	94	↓	↓		92	15	↓		U	↓		BUS OUT 6	
20	4	24	9	SEE TAB	A	END GND	3	2	B	END	W	14			

AA3183 REV. 8/71
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Figure 7-21. Cable Assembly Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 3 of 6)

ASSEMBLY PARTS LIST

SHT 9

9672149E	E	A	A	CABLE ASSY-STORAGE MOD BUS OUT	DSM	YA127R	09/22/79	022027	12/03/80	11	MF
ASSEMBLY NUMBER	REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE	NUMBER

FIND NUMBER	OW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/OUT PART TYPE	PC	OR
1	C	24501401	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	
2	C	24501409	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	
3	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	24514001	244.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N	
5	C	24524617	2.25	IN	INS SLEEVING, ELEC-RULK	IN			PPP3	N	
6	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 ALK RULK	IN			PPP4	N	
7	C	24534714	6.00	IN	SHRINK SLEEVE 3/4 ALK RULK	IN			PPP1	N	
8	C	24534711	5.00	IN	SHIELD ELEC BRAIDED-RULK	IN			PPP4	N	
9	A	30183345	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
10	A	30183331	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
11	A	30183342	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
12	A	30296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	A	30344900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	A	03645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
15	C	04245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
16	C	04277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N	
17	C	04288100	2.00	PC	PIN ASSY, CORNER GUIDE-FEMALE	IN			PPP4	N	
18	C	04288101	2.00	PC	PIN ASSY, CORNER GUIDE-MALE	IN			PPP4	N	
19	C	04360805	1.00	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N	
20	A	04780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	A	04780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	05044801	10.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	06753524	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	06785700	1.00	PC	CLAMP, U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 24
HIGHEST FIND NUMBER = 24

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INTERDIVISIONAL DOCUMENT

ASSEMBLY PARTS LIST

9672149E	E	A	A	CABLE ASSY-STORAGE MOD BUS OUT	DSM	CR 1A	09/22/79	022027	12/03/80	11	MF
ASSEMBLY NUMBER	REV	CL	OW	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE	NUMBER

FIND NUMBER	OW	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/OUT PART TYPE	PC	OR
1	C	24501401	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N	
2	C	24501409	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N	
3	C	24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N	
4	C	24524617	2.25	IN	INS SLEEVING, ELEC-RULK	IN			PPP3	N	
6	C	24534710	2.00	IN	SHRINK SLEEVE 3/8 ALK RULK	IN			PPP4	N	
7	C	24534714	6.00	IN	SHRINK SLEEVE 3/4 ALK RULK	IN			PPP1	N	
8	C	24534711	5.00	IN	SHIELD ELEC BRAIDED-RULK	IN			PPP4	N	
9	A	30183345	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
10	A	30183331	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
11	A	30183342	1.00	PC	LABEL, CONN FLOCK	IN			PPP4	N	
12	A	30296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N	
13	A	30344900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N	
14	A	03645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N	
15	C	04245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N	
16	C	04277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N	
17	C	04288100	2.00	PC	PIN ASSY, CORNER GUIDE-FEMALE	IN			PPP4	N	
18	C	04288101	2.00	PC	PIN ASSY, CORNER GUIDE-MALE	IN			PPP4	N	
19	C	04360805	1.00	PC	HOUSING-CONN, SOCKET .125 50CAV	IN			PPP4	N	
20	A	04780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N	
21	A	04780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N	
22	A	05044801	10.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N	
23	A	06753524	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N	
24	A	06785700	1.00	PC	CLAMP, U-TYPE .75 GAPX1.25	IN			PPP4	N	

NUMBER OF LINE ITEMS = 23
HIGHEST FIND NUMBER = 24

SCMD MFG INFO

INTERDIVISIONAL DOCUMENT

Figure 7-21. Cable Assembly Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 5 of 6)

ASSEMBLY PARTS LIST

SHT 11

95721497	R	A	A	CABLE ASSY-STORAGE MOD RUS OUT	DSM	CBR 18	09/24/79	022027	12/03/80	1-1	MF
ASSEMBLY NUMBER	REV	CL	SW	SE	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER
FIND NUMBER	SW	SE	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PH NC
1	C		24501801	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N
2	C		24501809	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N
3	C		24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N
4	C		24518001	484.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N
5	C		24528417	2.25	IN	INS SLEEVING, ELEC-RULK	IN			PPP3	N
6	C		24534710	2.00	IN	SHRINK SLEEVE 3/8 RLK BULK	IN			PPP4	N
7	C		24534714	6.00	IN	SHRINK SLEEVE 3/4 RLK BULK	IN			PPP1	N
8	C		24534811	5.00	IN	SHIELD ELECT BRAIDED-RULK	IN			PPP4	N
9	R		39183345	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
10	R		39183381	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
11	R		39183382	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
12	R		39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N
13	R		39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N
14	R		93645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N
15	C		94245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N
16	C		94277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N
17	C		94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N
18	C		94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N
19	C		94360805	1.00	PC	HOUSING-CONN,SOCKET .125 50CAV	IN			PPP4	N
20	R		94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N
21	R		94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N
22	A		95048801	10.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N
23	A		96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N
24	A		96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N
NUMBER OF LINE ITEMS = 24 HIGHEST FIND NUMBER = 24											

SCMD FEG INFO

INTERDIVISIONAL DOCUMENT

ASSEMBLY PARTS LIST

SHT 12

96721498	R	A	A	CABLE ASSY-STORAGE MOD RUS OUT	DSM	CBR 18	09/24/79	022027	12/03/80	1-1	MF
ASSEMBLY NUMBER	REV	CL	SW	SE	ASSEMBLY DESCRIPTION	DESIGN SOURCE	FIRST USAGE	RELEASE DATE	CHANGE ORD. NUMBER	PROCESSING DATE	PAGE NUMBER
FIND NUMBER	SW	SE	PART NUMBER	QUANTITY	UNIT MEAS.	PART DESCRIPTION	IN/OUT STATUS	CHANGE ORD. NUMBER	DATE EFFECTIVE	NAME/BUY PART TYPE	PH NC
1	C		24501801	2.00	IN	WIRE ELECT SOLID COPPER 22 GA	IN			PPP1	N
2	C		24501809	3.00	IN	WIRE ELECT SOLID COPPER 18 GA	IN			PPP1	N
3	C		24502303	1.00	PC	CONN RECP ELEC 50 PIN	IN			PPP4	N
4	C		24518001	484.00	IN	CABLE ELEC 24 TWISTED PR	IN			PPP4	N
5	C		24528417	2.25	IN	INS SLEEVING, ELEC-RULK	IN			PPP3	N
6	C		24534710	2.00	IN	SHRINK SLEEVE 3/8 RLK BULK	IN			PPP4	N
7	C		24534714	6.00	IN	SHRINK SLEEVE 3/4 RLK BULK	IN			PPP1	N
8	C		24534811	5.00	IN	SHIELD ELECT BRAIDED-RULK	IN			PPP4	N
9	R		39183345	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
10	R		39183381	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
11	R		39183382	1.00	PC	LABEL, CONN BLOCK	IN			PPP4	N
12	R		39296400	2.00	PC	LABEL, CABLE MARKING	IN			PPP4	N
13	R		39348900	1.00	PC	SHIELD MODIFICATION-50PIN CONN	IN			AYE4	N
14	R		93645003	50.00	PC	CONTACT SOCKET SERIES .062	IN			PPP4	N
15	C		94245601	50.00	PC	CONTACT-CRIMP INSERT SOCKET	IN			PPP4	N
16	C		94277400	4.00	PC	STRAP CABLE TIE	IN			PPP4	N
17	C		94288100	2.00	PC	PIN ASSY,CORNER GUIDE-FEMALE	IN			PPP4	N
18	C		94288101	2.00	PC	PIN ASSY,CORNER GUIDE-MALE	IN			PPP4	N
19	C		94360805	1.00	PC	HOUSING-CONN,SOCKET .125 50CAV	IN			PPP4	N
20	R		94780401	1.00	PC	SCREW-JACK-FEMALE	IN			PPP4	N
21	R		94780402	1.00	PC	SCREW-JACK-MALE	IN			PPP4	N
22	A		95048801	10.00	IN	SLEEVING-BRAIDED 1/2 IN	IN			PPP3	N
23	A		96753526	1.00	PC	TERM SPADE SPRNG 12-10AWG NO 6	IN			PPP4	N
24	A		96785700	1.00	PC	CLAMP,U-TYPE .75 GAPX1.25	IN			PPP4	N
NUMBER OF LINE ITEMS = 24 HIGHEST FIND NUMBER = 24											

SCMD FEG INFO

INTERDIVISIONAL DOCUMENT

Figure 7-21. Cable Assembly Disk Adapter to Control Unit
Single CPU Bus Out (Sheet 6 of 6)

GLOSSARY

A

ADCOM	Address compare	COMAD	Common address
ADFind	Address find	COMPL	Transfer complete, but with error
ADR	Read or write address field	CUOP	Control unit operation
ADREP	Address reply	CUSEL	Control unit selected flip-flop
ADRF	Address field	CWA	Current word address
AGAIN	Autoload read drive status 2 again	DECHO	Drive echo
AL	A register, lower	DMA	Direct memory access
ALRM1	Alarm status flip-flop	DMACLR	Clear DMA logic
ALDON	All done	ECC	Error correction code
ALENB	Autoload enable	EOC	End of cylinder
A/Q REJ	A/Q reject flip-flop	ERR	Error
AU	A register, upper		
AUTO	Autoload flip-flop		
AUTSEL	Autoload select	FLR	Field-length register
AQEXEC	A/Q execute flip-flop	FLTCL	Fault clear
AQREP	A/Q reply flip-flop	FULWRT	Full write cycle flip-flop
BL	Buffer length	IDLE	Idle loop entry point
BLEQZERO	Buffer length equals 0	ILL	Illegal; A/Q reject
BUFFL	Buffer length register	INC	Increment
BOR	BUSOUT register	IOER	Input/output (I/O) error
BRCHK	Check output buffer register	JMPF	Jump if false
BREMPYT	Output buffer register empty	JMPT	Jump if true
BUSIN	Eight data lines from control unit to drive adapter	L	Lower
BUSOUT	Eight data lines from drive adapter to control unit	LPFLG	Loop flag
BUSY	Busy flip-flop	MIR	Micro-instruction register
CE	CHECKEND	NE	NORMALEND
CHKCU	Check control unit	NEORCE	NORMALEND or CHECKEND
CHKHD	Check head	NOP	No operation
CLR	Clear		

PP	Program protect	TAGOUT	Tag out flip-flop
QEQ8	Q register equals 8	TAGVALID	Tag valid from control unit
RAM	Random-access memory	TBR	TAGBUS register
REP	A/Q reply	TCOMP	Transfer complete
REPT	Repeat; read next address field	TM	Test mode
RESP	Response	TMW	Test mode write
ROWCOM	Read or write common entry point	TXCPL	Transfer complete
R1	R1 register	U	Upper
R1EQRAM	R1 register equals random-access memory	UJP	Unconditional jump
R1MSB	R1 register most significant bit		
R1 to A	R1 register to the A-register flip-flop		
RRET	Read return	XCOMP	Transfer complete
SEL	Select		
SFWAU	Set first word address upper	WRET	Write return

FLOWCHARTS

B

This appendix includes figure B-1, the firmware flowcharts, and figure B-2, the transform jump table. It is intended for use in conjunction with the disk adapter logics and appendix C, the controlware listing. Appendix C can be used to determine the actual read-only memory cell location of a particular flowblock.

PROGRAM LABELS

A/Q FUNCTION/STATUS ENTRY POINTS

<u>Program Label</u>	<u>Sheet Number</u>	<u>Description</u>
BUFFL	6	Load buffer length register
CSS	5	Current sector status
CUSTA	5	Control unit status
COND	5	ECC condition status
CYLST	6	Cylinder address status
DECHO	7	Drive echo
DFS	7	Drive fault status
DRST1	5	Drive status 1
DRST2	5	Drive status 2
FORMAT	13	Format write
PATT	7	ECC pattern status
POLL	5	Initiate poll
PHYS	5	Physical unit status
RCONT	17	Read recovery control
SEC	16	Set sector and head address
SECST	6	Sector and head status
SFWAL	6	Set first word address, lower
SFWAU	47	Set first word address, upper
SEL	7	Select control unit or drive
SEEK	8	Load cylinder address
SPEC	47	Special for diagnostic testing
TMW	28	Test mode write data
AUTO	40	Autoload entry point
DRST1 and 2	5	Drive status

<u>Program Label</u>	<u>Sheet Number</u>	<u>Description</u>
TMR	29	Test mode read data
WRITE	19	Write data or address field
REED	19	Read data or address field
WAIT	2	Director function or status wait loop
CUOP	3	Common routine for control unit tag sequences
TFORM	1	Q transform
HIGH	B-2	Transform jump table instructions

MISCELLANEOUS ENTRY POINTS

<u>Program Label</u>	<u>Sheet Number</u>	<u>Description</u>
IDLE	1	Idle loop
ILL	2	A/Q reject
REP	2	A/Q reply
CHKCU	3	Check for control unit select
RESP1	4	Response to control unit
SET B	5	Set TAGBUS register to B
SET 8	5	Set TAGBUS register to 8
OUT	9	Output to the control unit
OUTLP	14	Format write time out
INLP	14	Format write time out
FWEND	15	Format write time out complete
BRCHK	19	Check output buffer register for empty
ADFIND	22	Search for requested address field
ADCOM	22	Compare current address field to requested
REPT	22	Read next address field
NOCOM	27	Current address field does not compare with requested

<u>Program Label</u>	<u>Sheet Number</u>	<u>Description</u>
ALDON	28	Test mode write transfer complete termination sequence
TCOMP	28	Test mode read address field, data or ECC check transfer complete termination sequence
ROWCOM	30	Read or write data common entry point
WRET	30	Entry to write data
RRET	30	Entry to read data
DONE	31	Transfer is complete
GOON	32	More data to transfer
CHKHD	33	Check current head address for equal to maximum
ADR	36	Read or write address field
ADREP	37	Read or write more address field
COMAD	38	Common address field routine
MORE	38	Read or write more address field
DRSEL	40	Autoload drive select
FLTCL	42	Autoload clear faults
AGAIN	43	Autoload read drive status 2 again

CROSS REFERENCE

The following is a list of instructions found in the flow charts with the sheet numbers where they can be found:

<u>Instruction</u>	<u>Sheet Number</u>
ADCOM	22
ADFind	22
ADR	36
ADREP	36
AGAIN	43
ALDON	28
AUTO	40
BRCHK	19
CE1	4
CE2	10
CE3	35
CHKCU	3
CHKHD	33
COMAD	37
COMPL	39
COND	5
CSS	5
CUOP	3
CUSTA	5
CYLST	6
DECHO	7
DFS	5
DONE	31
DRSEL	40
DRST1	5
DRST2	5

ERROR ENTRY POINTS

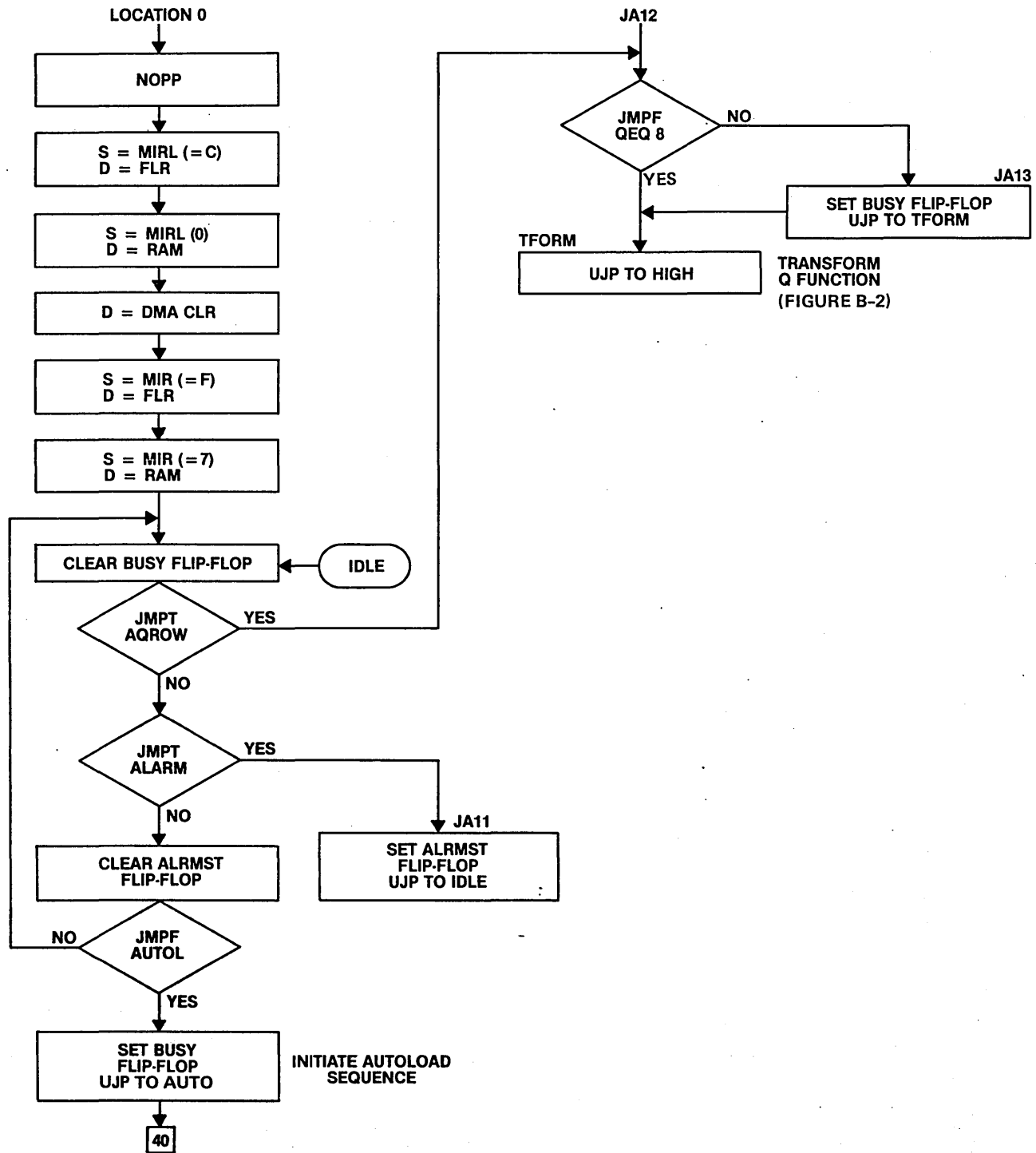
<u>Program Label</u>	<u>Sheet Number</u>	<u>Description</u>
RESP1,2,3, 4,6, and 7	4,10,31,35	Response to control unit
CE1 and CE2	4,10	Check end errors
ERR1,2,3,7, and 8	3,9,27,39	Miscellaneous errors
IOER1,2,3,5, and 6	4,12,15,23,25	I/O errors
IOERR	30	Common I/O error
ERRX	39	Read or write error
COMPL	39	Transfer complete with error

ERR1	3
ERR2	9
ERR3	9
ERR7	27
ERR8	27
ERRX	39
FLCTL	42
FORMAT	13
FWEND	15
GOON	32
HIGH	B-2
IDLE	1
ILL	2
INLP	14
IOER1	4
IOER2	12
IOER3	15

<u>Instruction</u>	<u>Sheet Number</u>
IOER5	30
IOER6	35
IOERR	30
MORE	38
NOCOM	27
OUT	9
OUTLP	14
PATT	5
PHYS	5
POLL	11
RCONT	17
REED	19
REP	2
REPT	22
RESP1	4
RESP2	10

<u>Instruction</u>	<u>Sheet Number</u>
RESP3	12
RESP4	15
RESP6	31
RESP7	35
ROWCOM	30
RRET	30
SEC	16
SECST	6
SEEK	8
SEL	7
SETB	5
SET8	5
SFWAL	6
SFWAU	47
SPEC	47
TCOMP	28
TMR	29
TMW	28
WAIT	2
WRET	30
WRITE	19

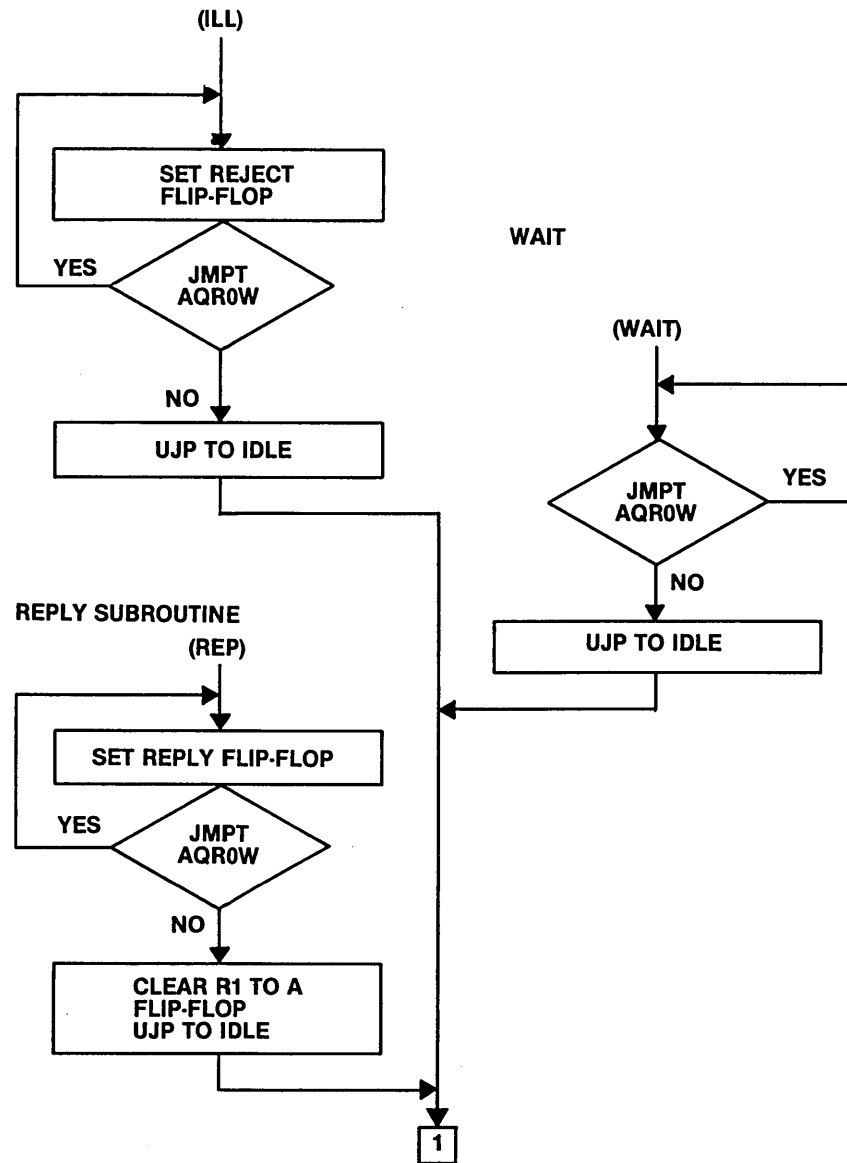
IDLE LOOP



1934

Figure B-1. Module Drive Adapter Flowcharts (Sheet 1 of 47)

ILLEGAL



1935

Figure B-1. Module Drive Adapter Flowcharts (Sheet 2 of 47)

DRIVE REQUEST ECC CONTROL

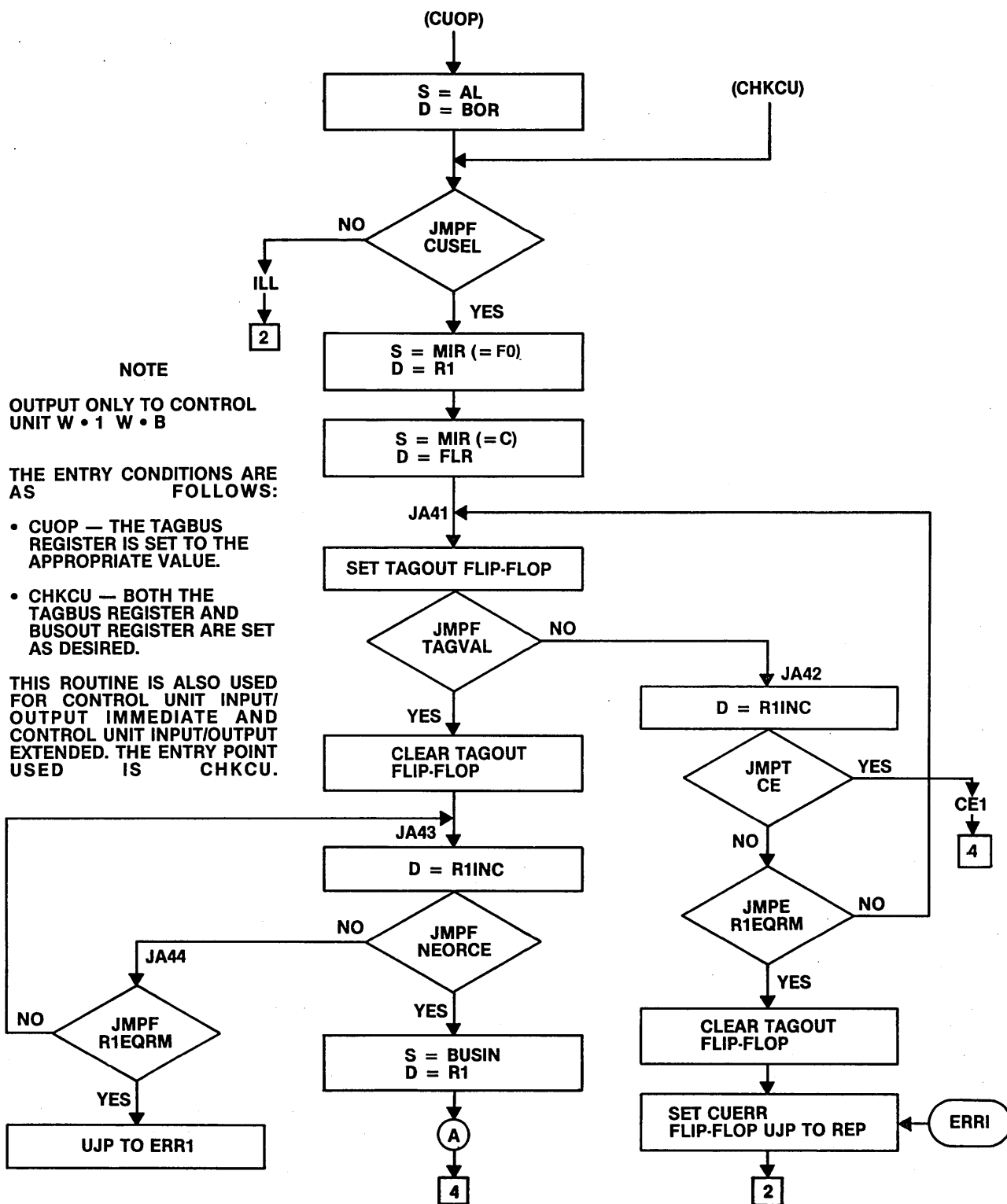
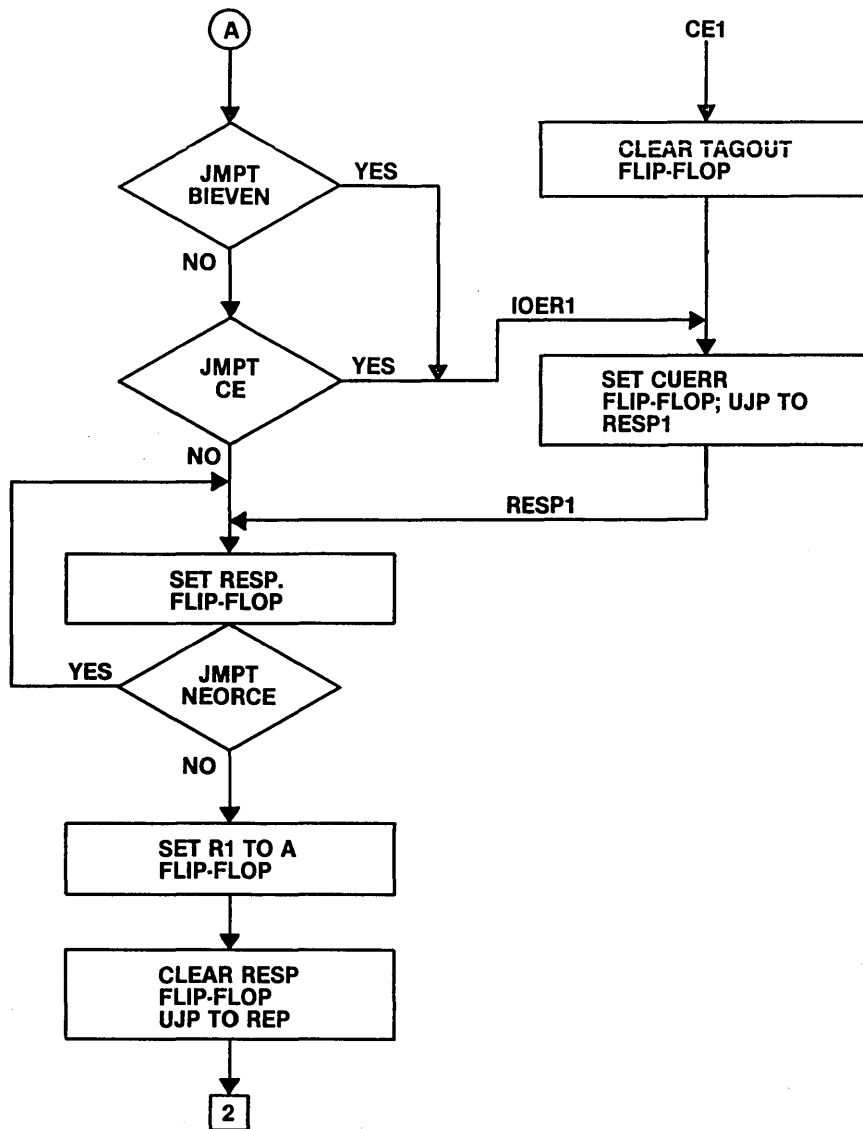


Figure B-1. Module Drive Adapter Flowcharts (Sheet 3 of 47)



1937

Figure B-1. Module Drive Adapter Flowcharts (Sheet 4 of 47)

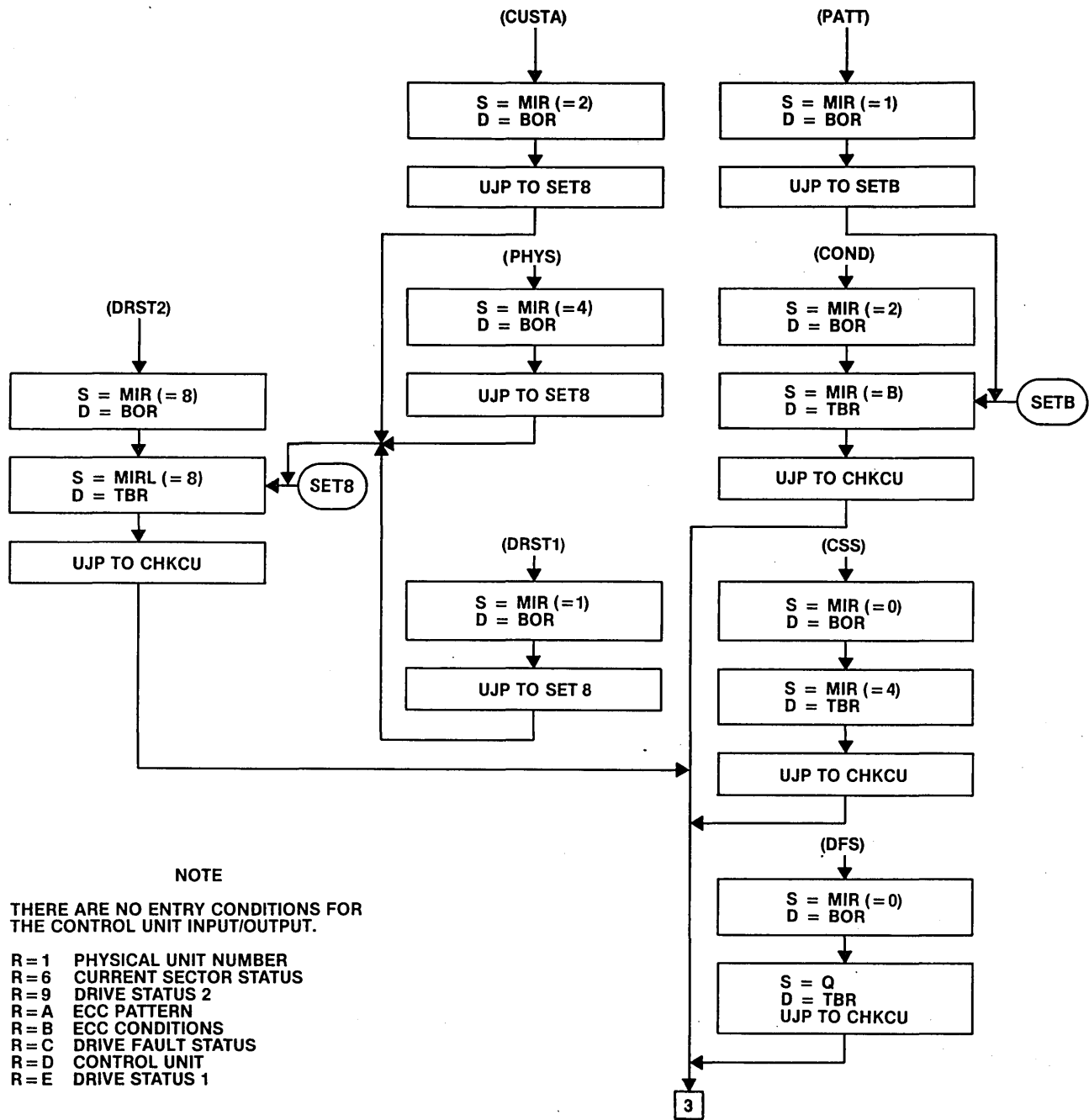
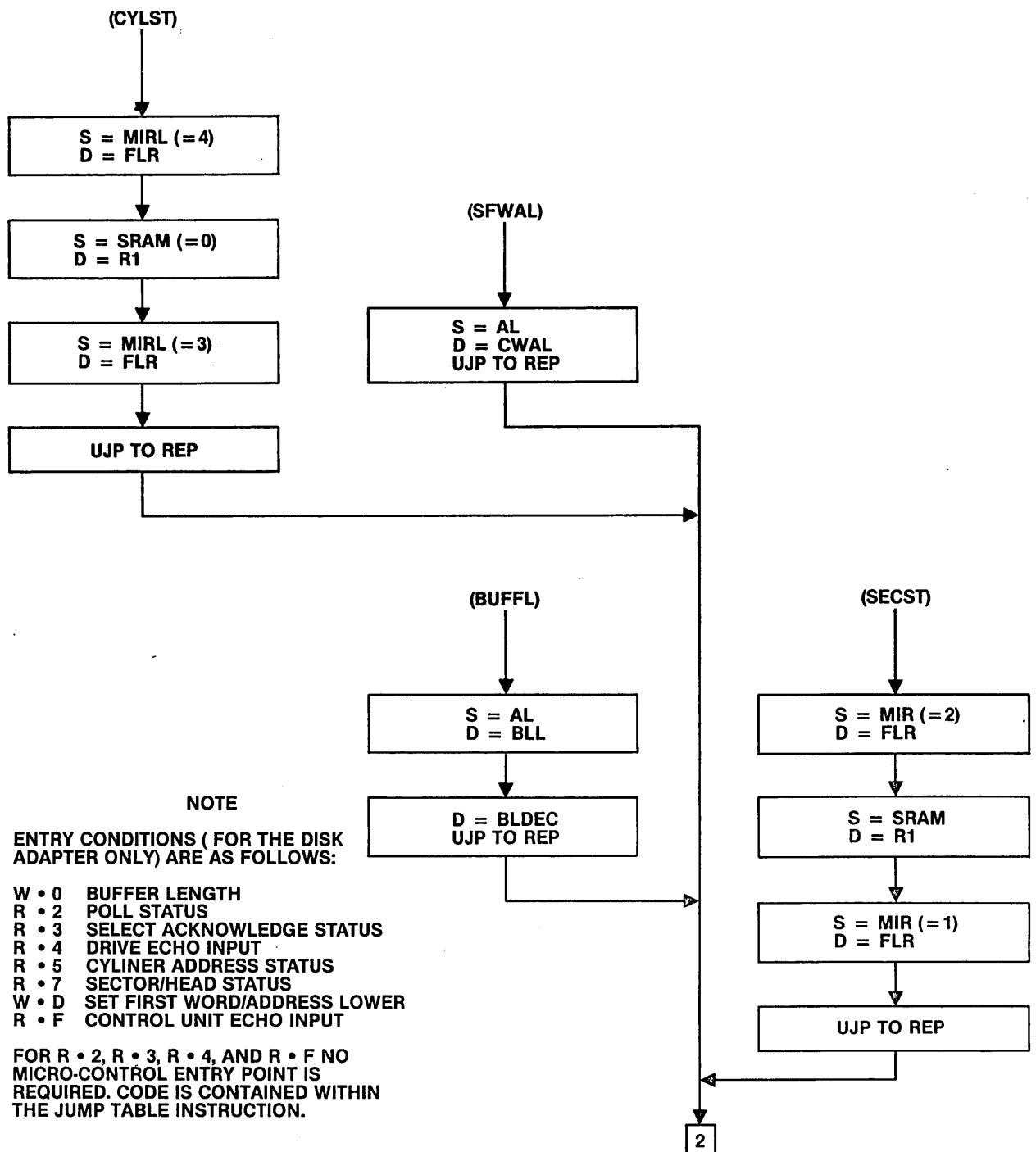
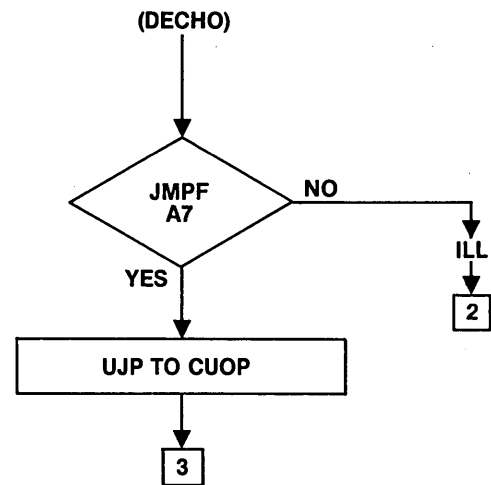
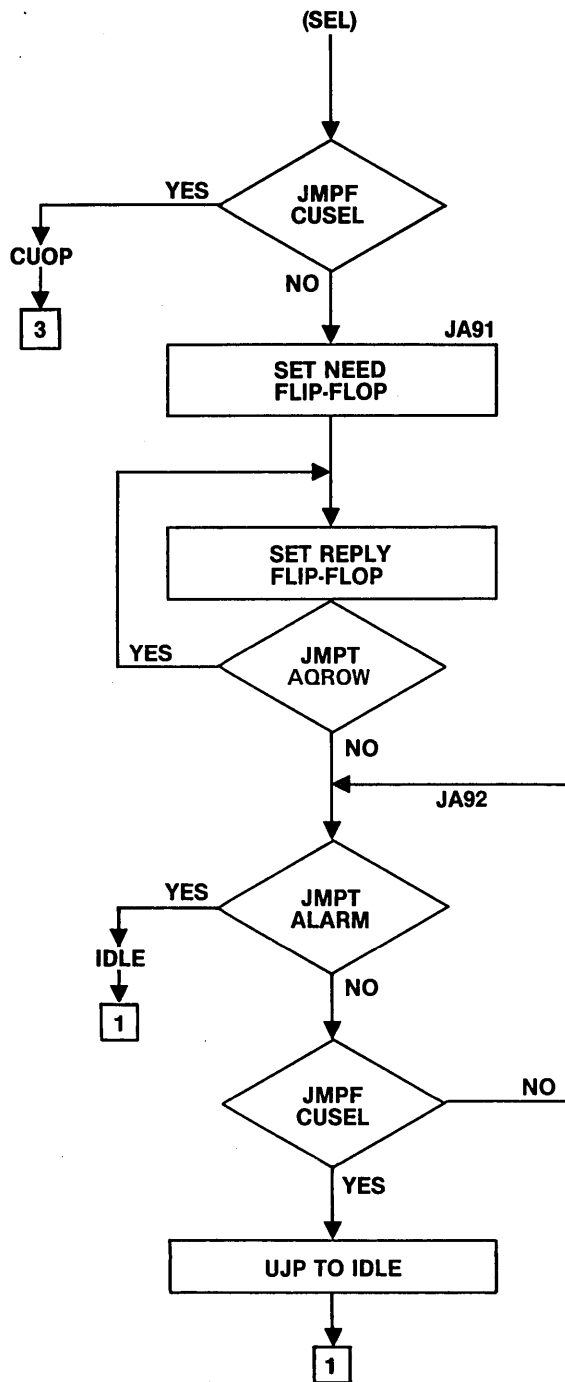


Figure B-1. Module Drive Adapter Flowcharts (Sheet 5 of 47)



1939

Figure B-1. Module Drive Adapter Flowcharts (Sheet 6 of 47)



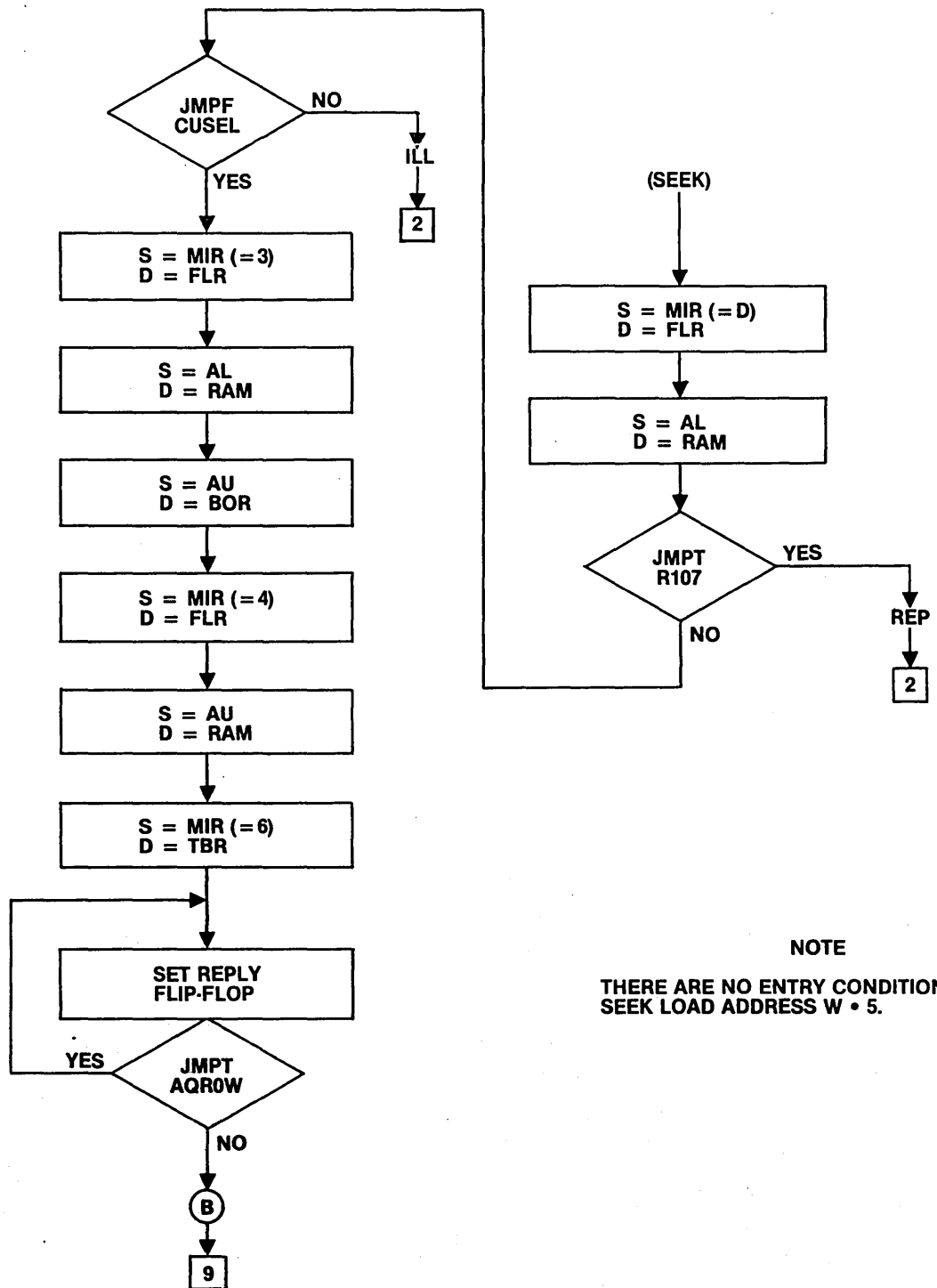
NOTE

THERE ARE NO ENTRY CONDITIONS FOR THE CONTROL UNIT INPUT/OUTPUT EXTENDED.

THE TAGBUS REGISTER IS SET AS REQUIRED.

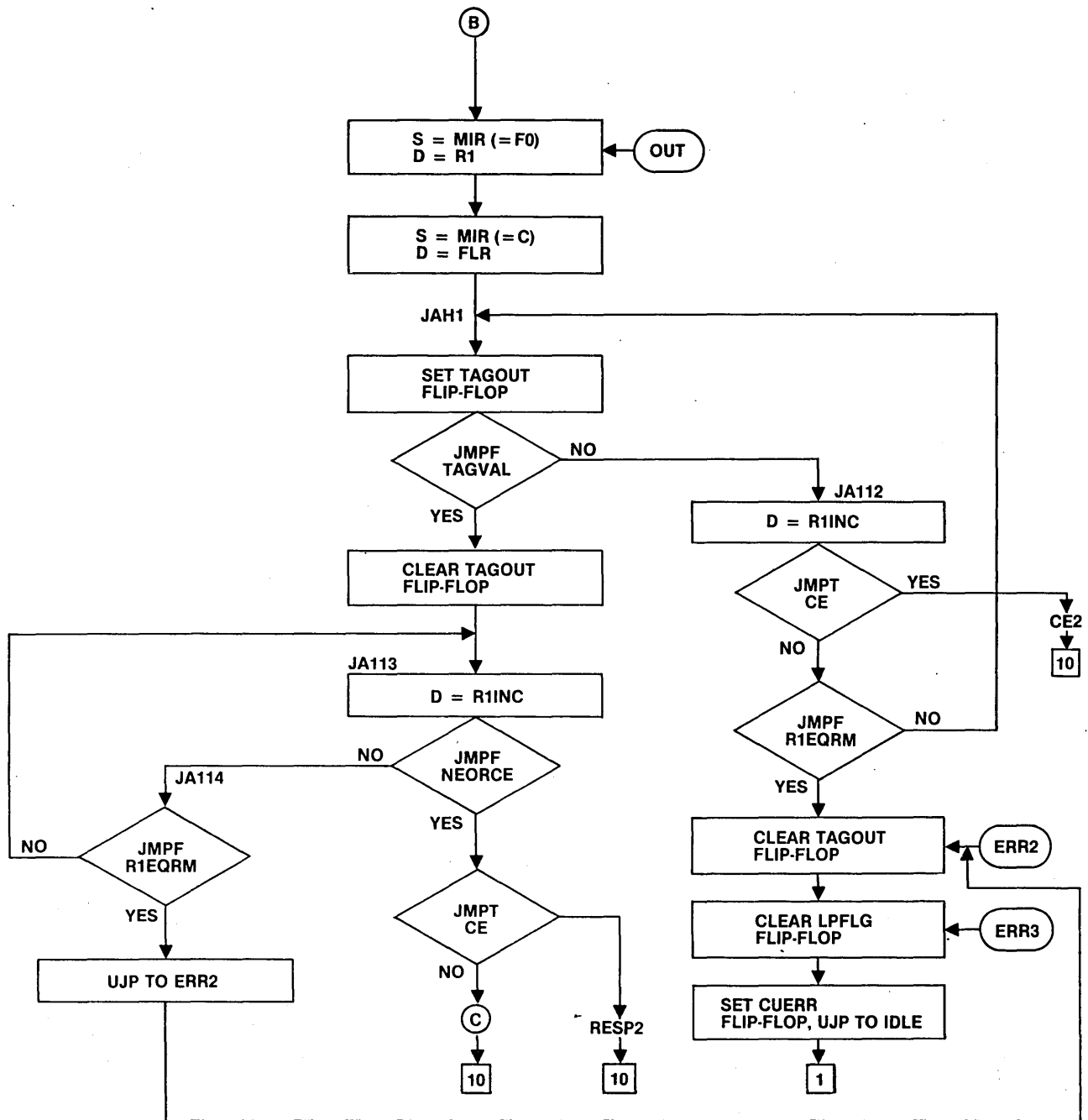
W • 3 UNIT SELECT
 W • 4 DRIVE ECHO OUTPUT
 W • F CONTROLLER/FORMATTER
 ECHO OUTPUT(ENTRY POINT IS CUOP)

Figure B-1. Module Drive Adapter Flowcharts (Sheet 7 of 47)



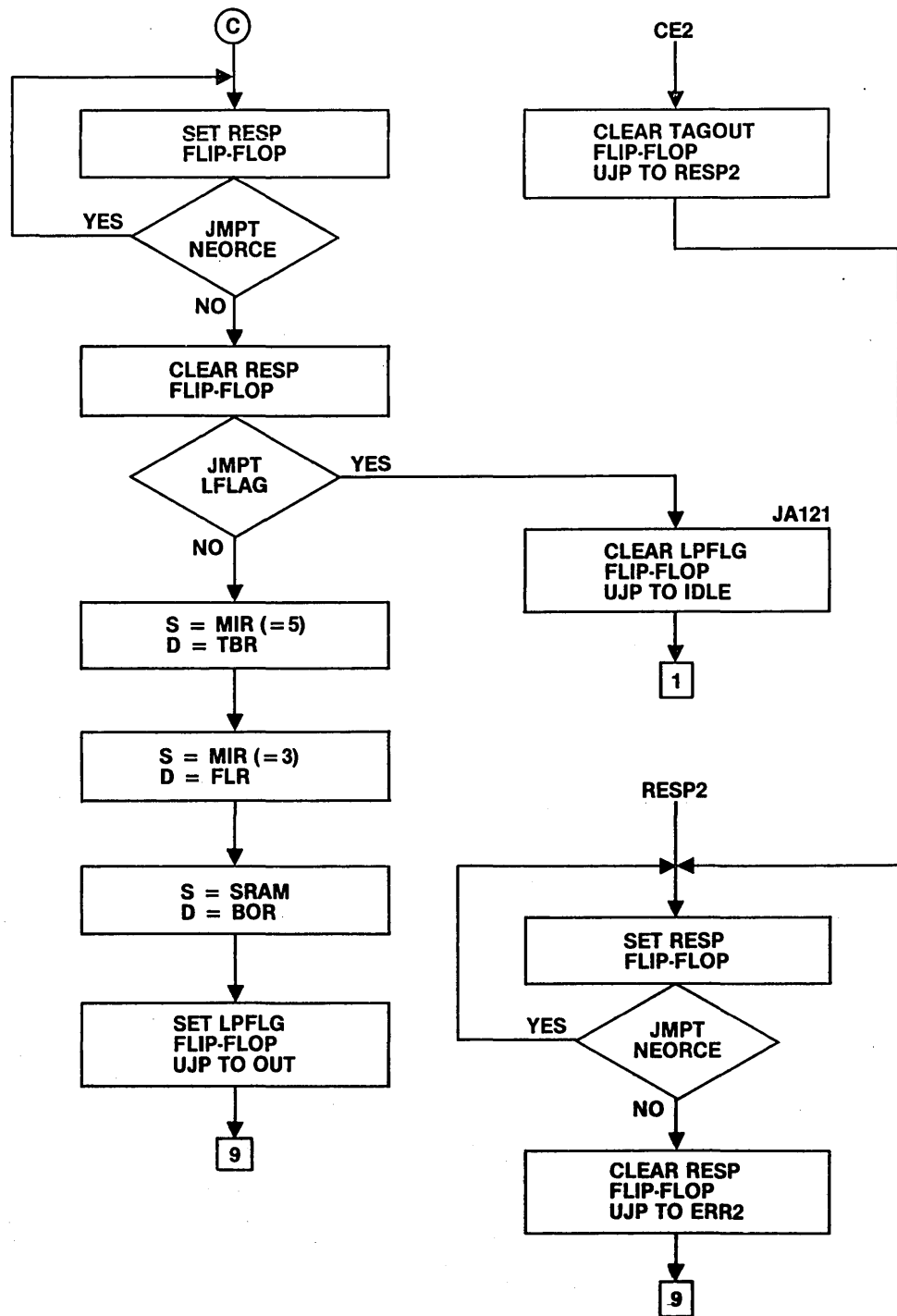
1941

Figure B-1. Module Drive Adapter Flowcharts (Sheet 8 of 47)



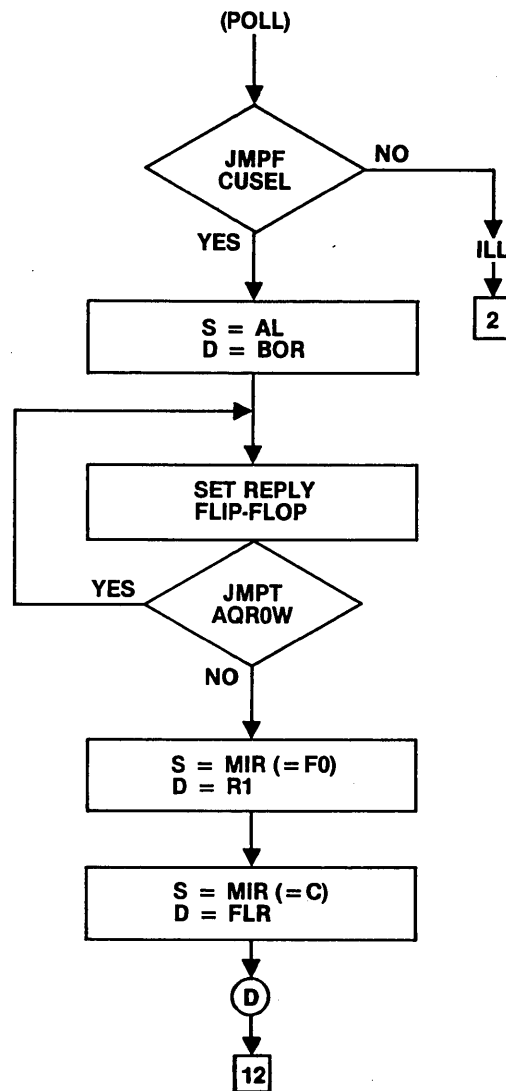
1942

Figure B-1. Module Drive Adapter Flowcharts (Sheet 9 of 47)



1943

Figure B-1. Module Drive Adapter Flowcharts (Sheet 10 of 47)

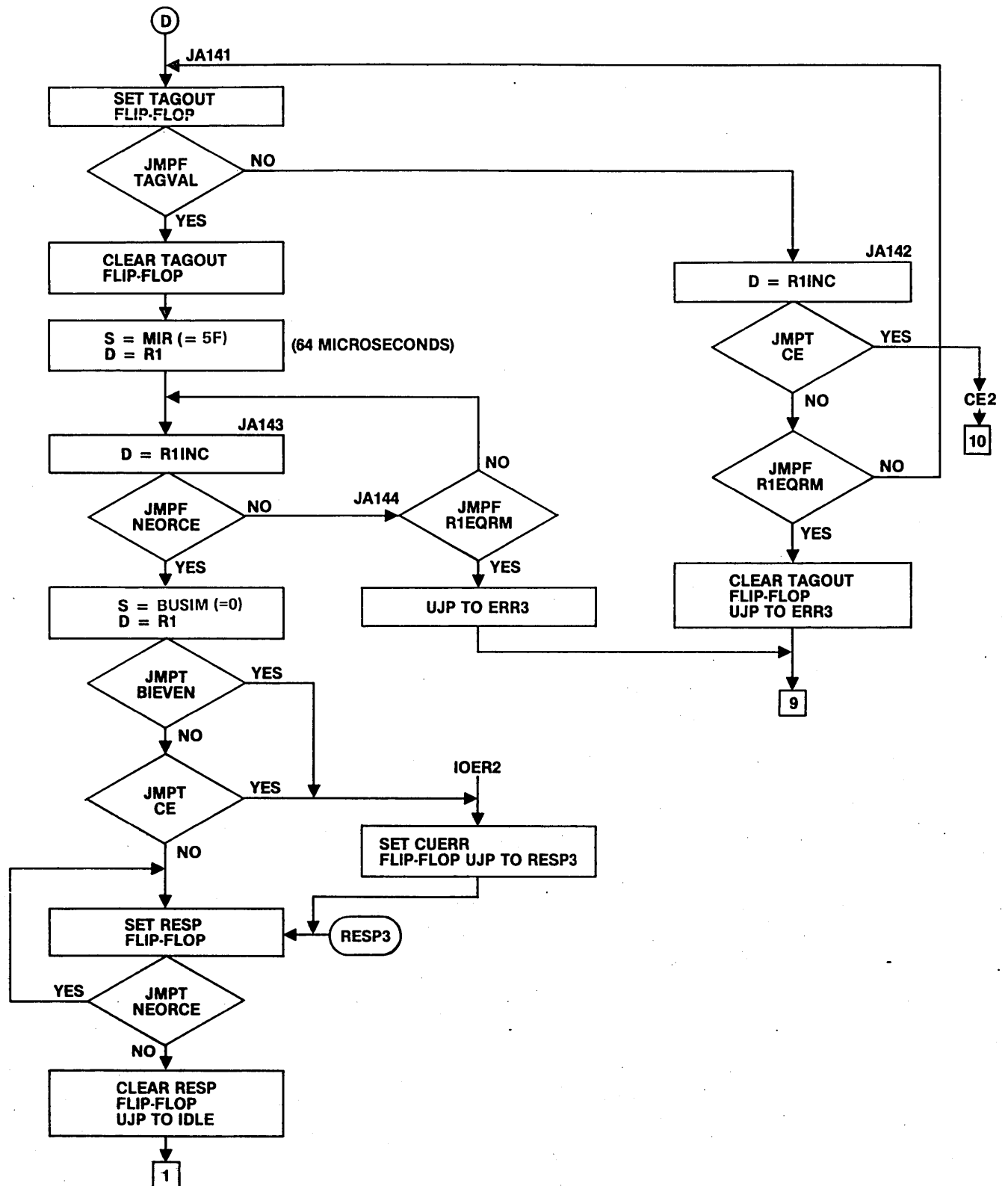


NOTE

THE ENTRY CONDITION FOR INITIATE POLL
W • 2 IS AS FOLLOWS:

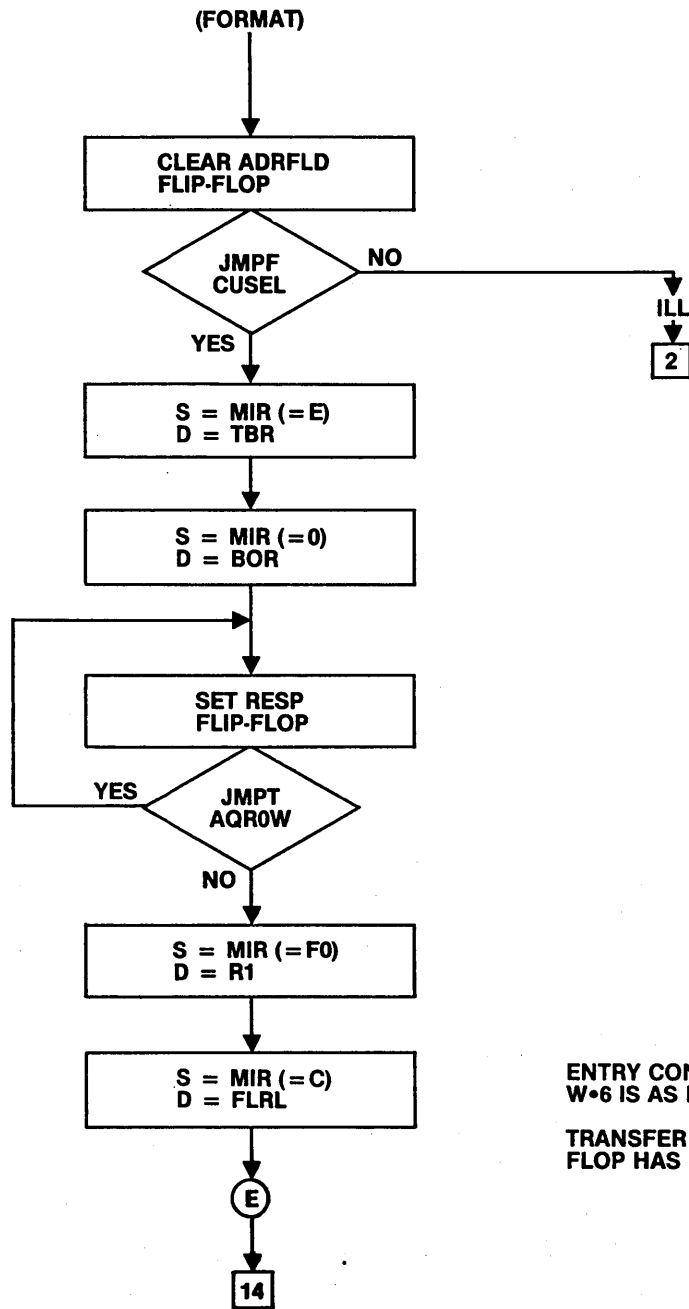
- 1944 • SET THE TAGBUS REGISTER TO 2

Figure B-1. Module Drive Adapter Flowcharts (Sheet 11 of 47)



1945

Figure B-1. Module Drive Adapter Flowcharts (Sheet 12 of 47)



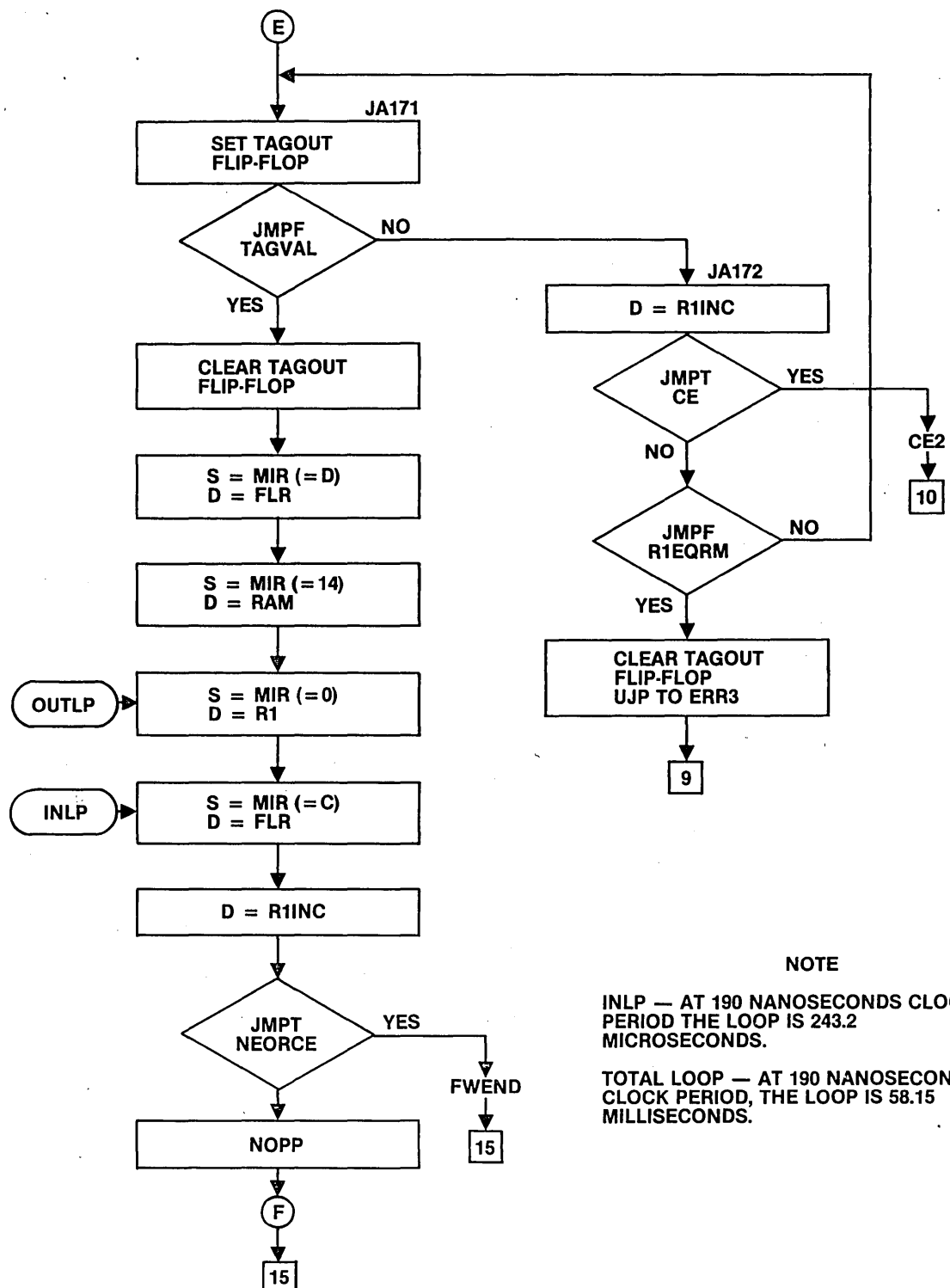
NOTE

**ENTRY CONDITION FOR FORMAT WRITE
W*6 IS AS FOLLOWS:**

**TRANSFER COMPLETE FLIP-
FLOP HAS BEEN CLEARED**

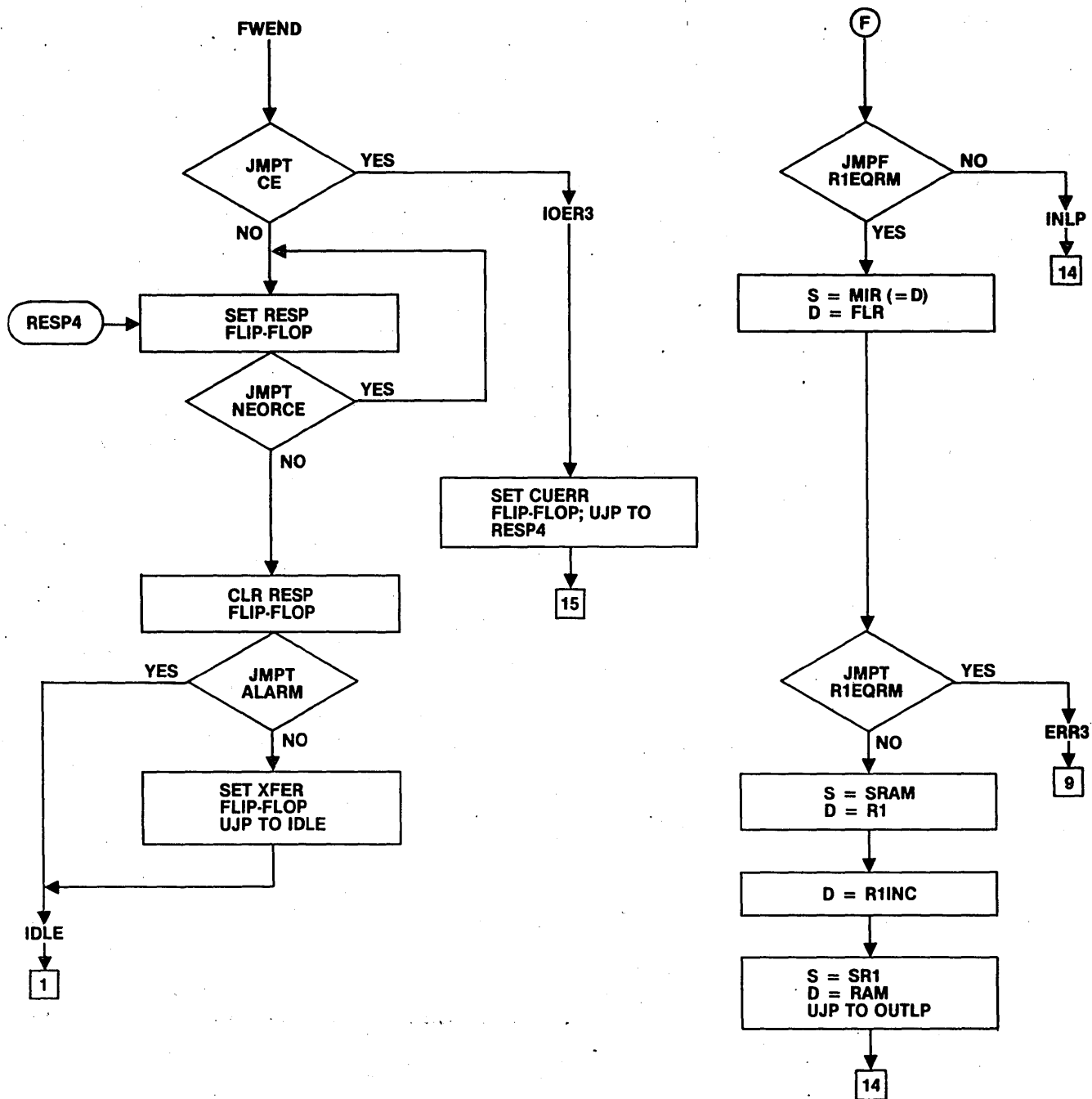
1946

Figure B-1. Module Drive Adapter Flowcharts (Sheet 13 of 47)



1947

Figure B-1. Module Drive Adapter Flowcharts (Sheet 14 of 47)



1948

Figure B-1. Module Drive Adapter Flowcharts (Sheet 15 of 47)

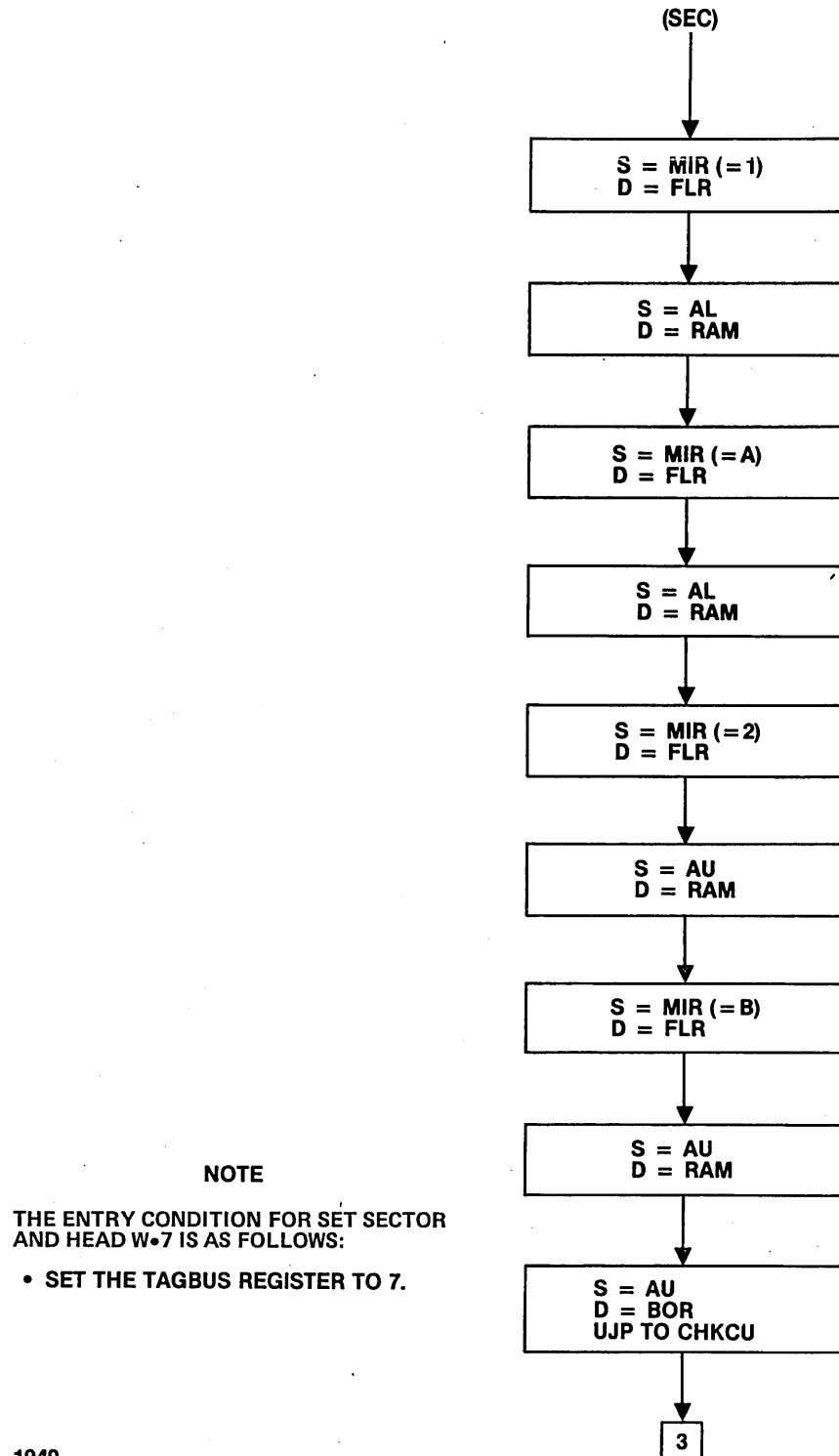


Figure B-1. Module Drive Adapter Flowcharts (Sheet 16 of 47)

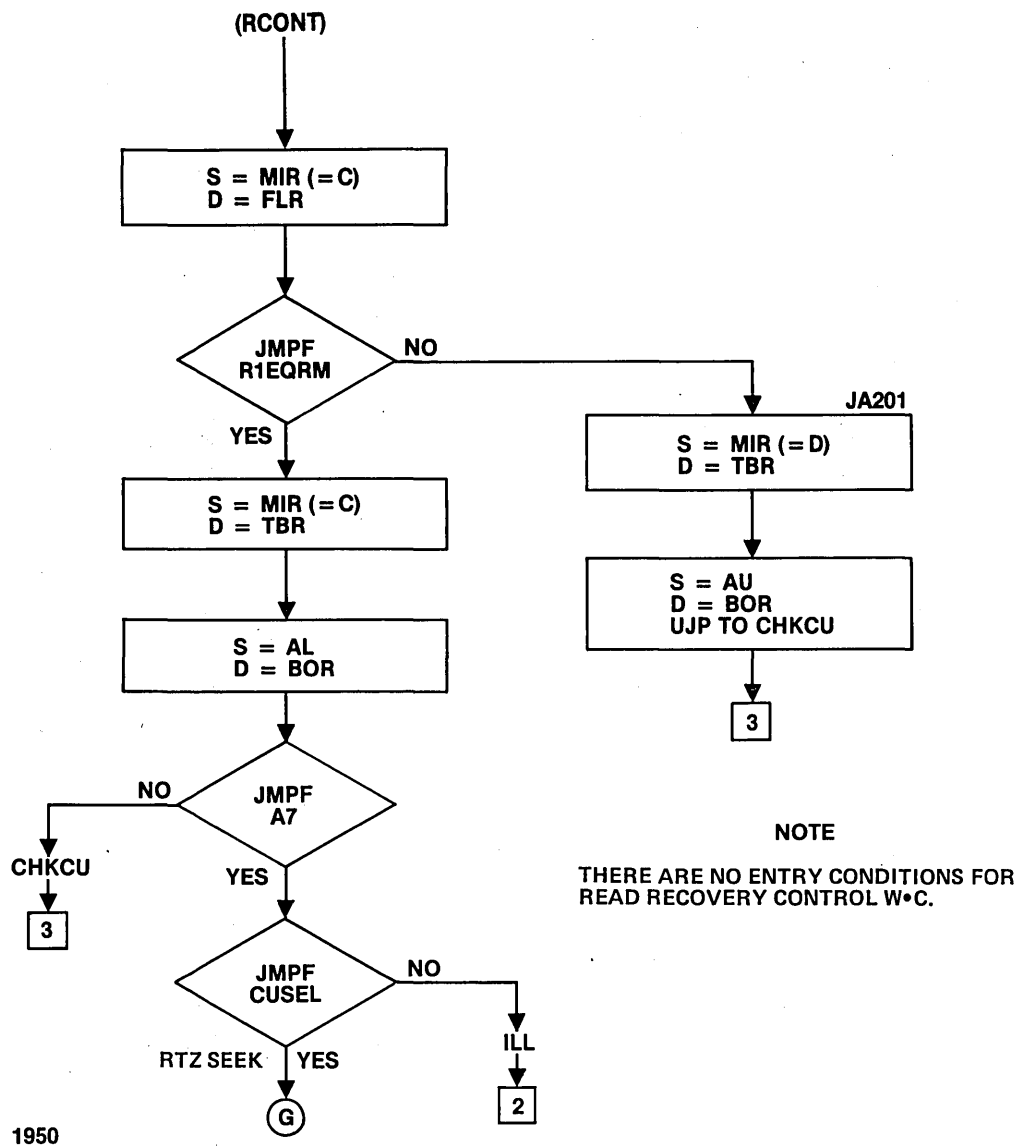
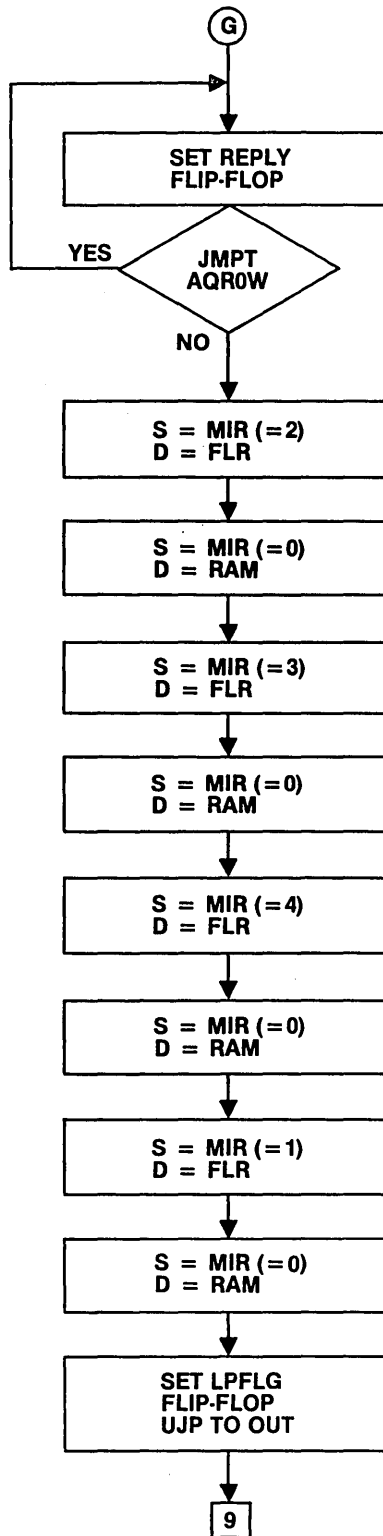


Figure B-1. Module Drive Adapter Flowcharts (Sheet 17 of 47)



1951

Figure B-1. Module Drive Adapter Flowcharts (Sheet 18 of 47)

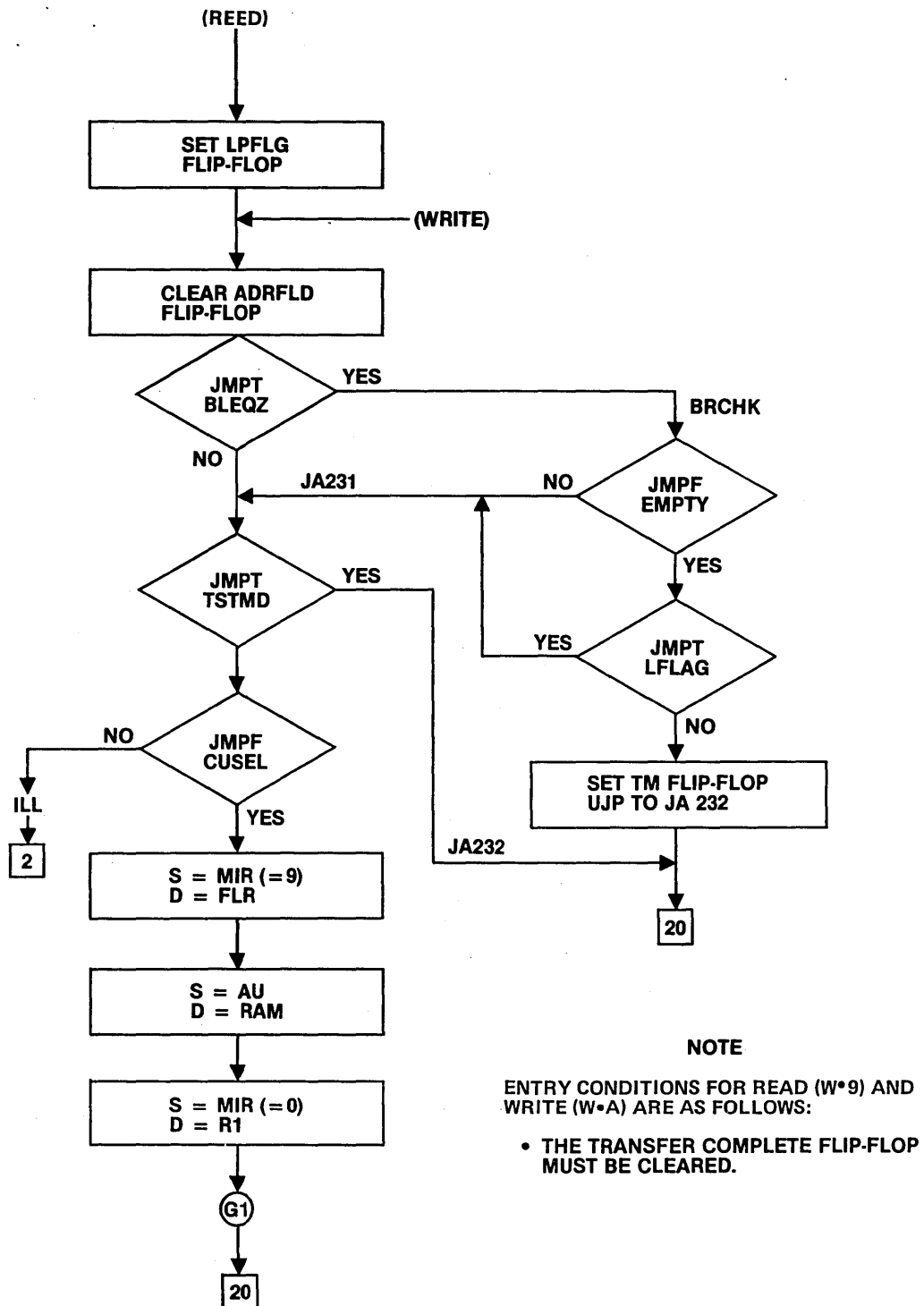
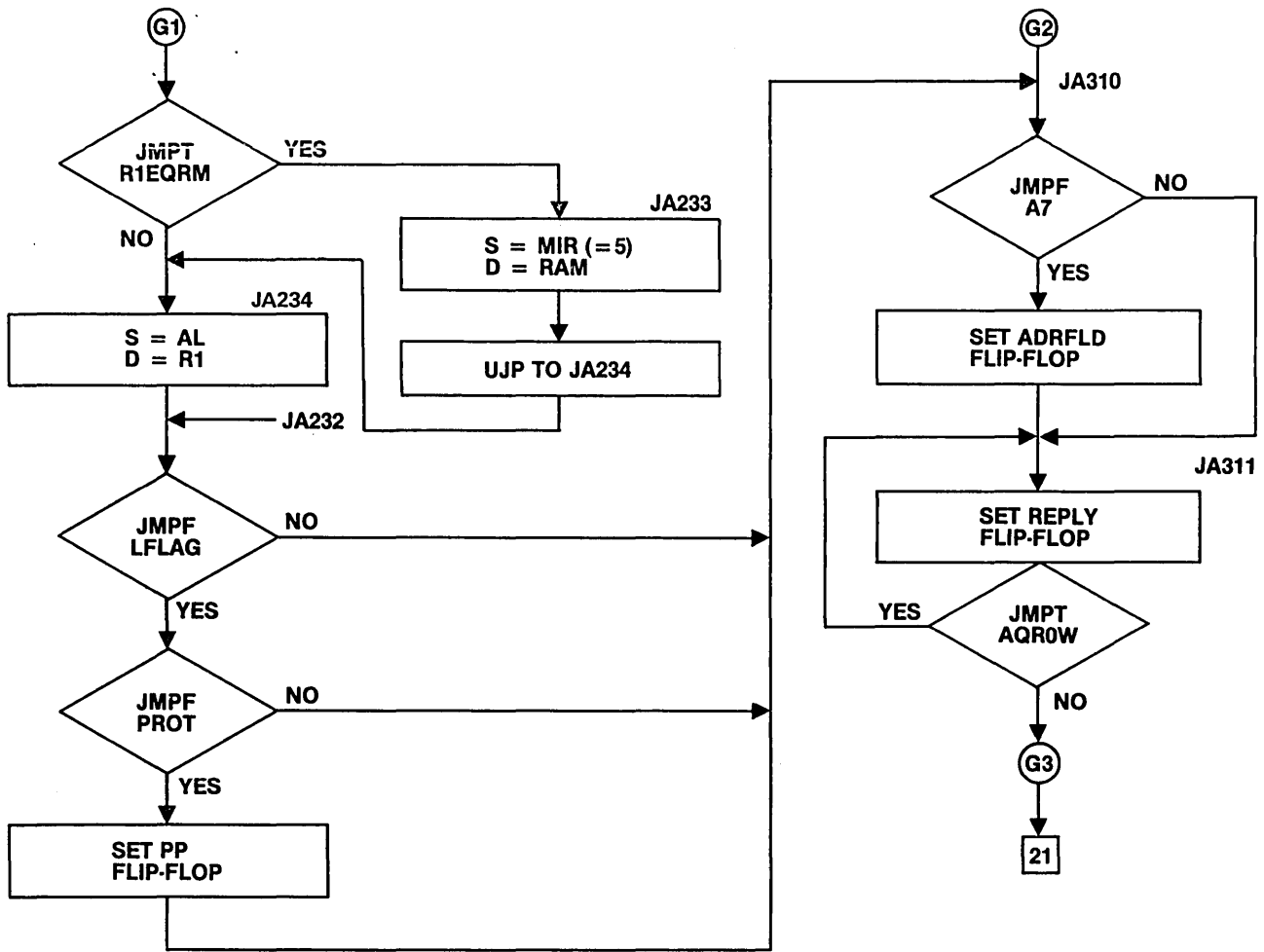
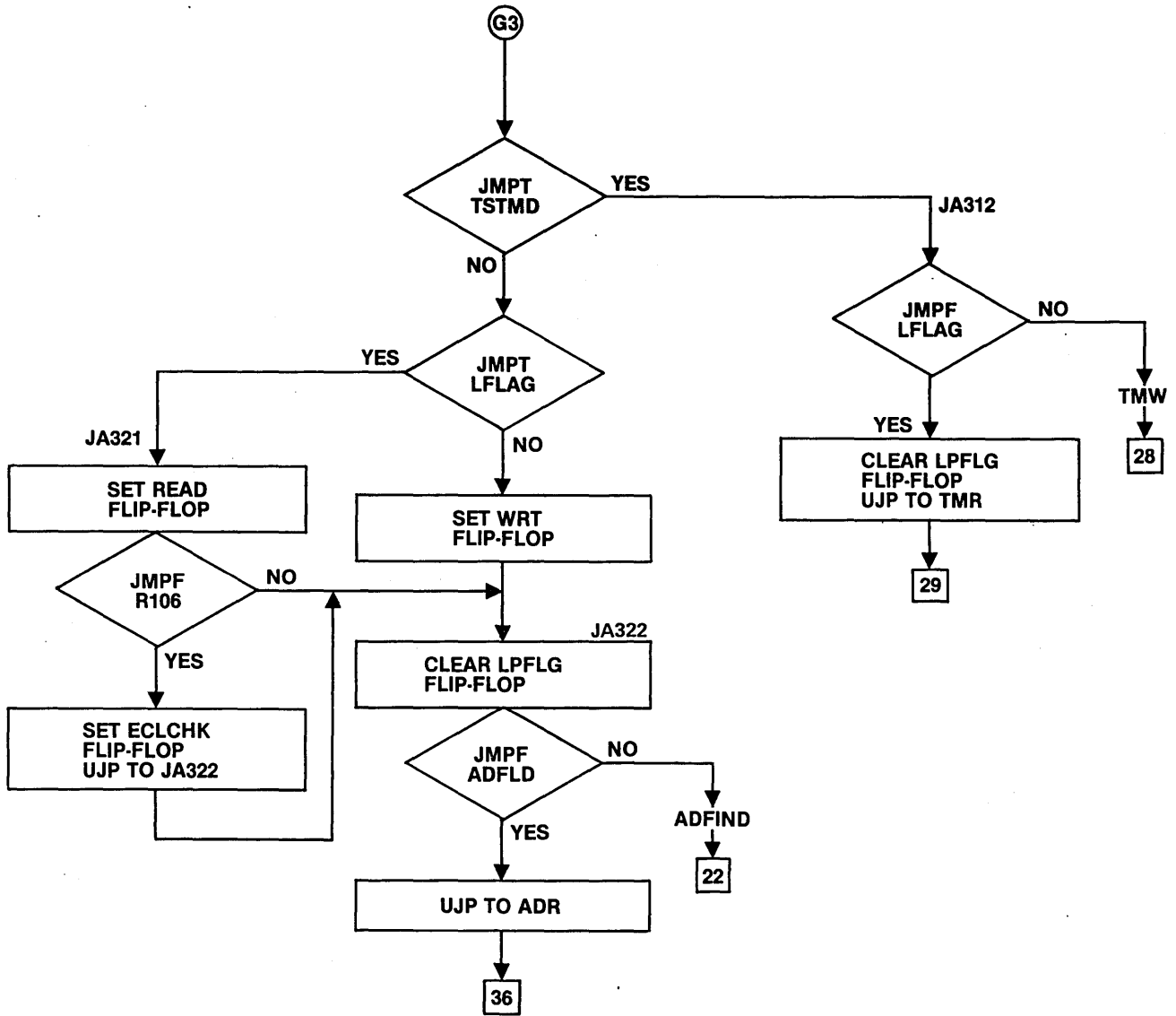


Figure B-1. Module Drive Adapter Flowcharts (Sheet 19 of 47)



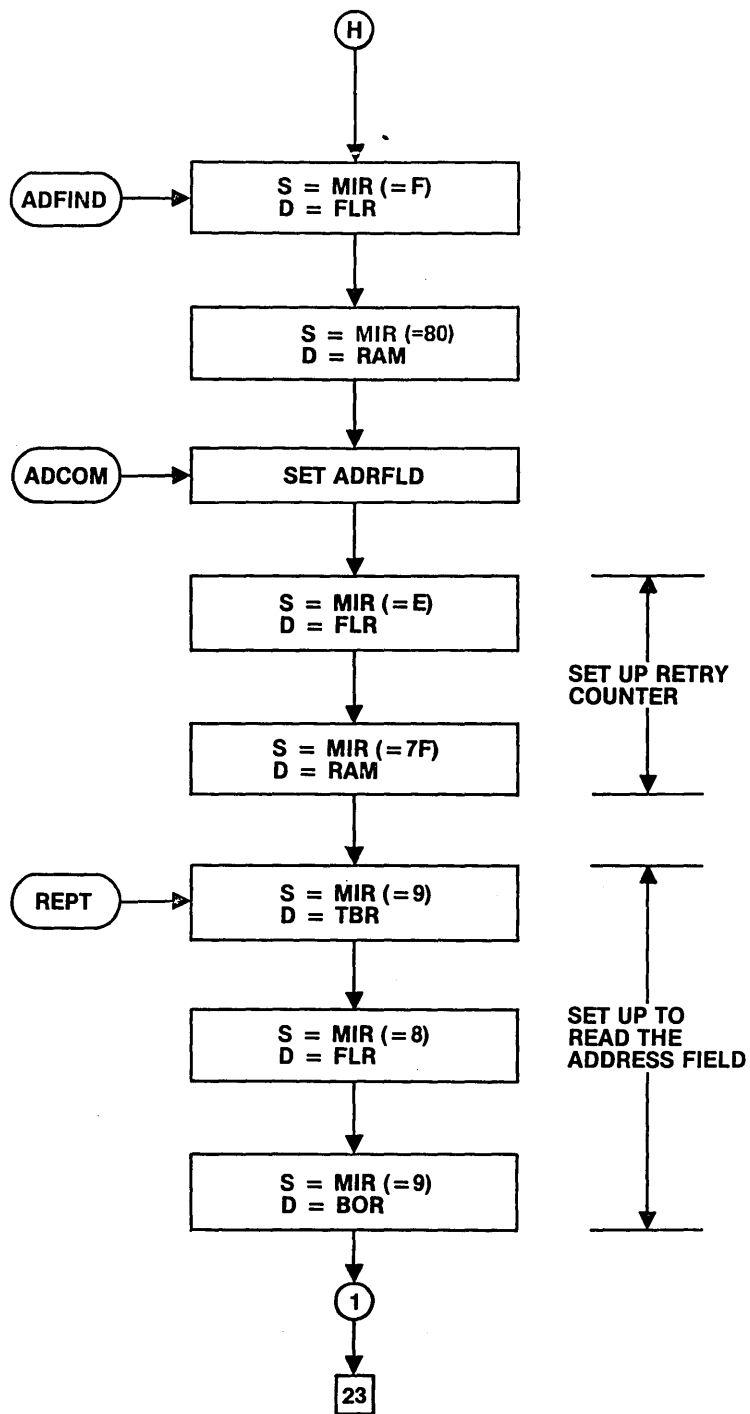
1953

Figure B-1. Module Drive Adapter Flowcharts (Sheet 20 of 47)



1954

Figure B-1. Module Drive Adapter Flowcharts (Sheet 21 of 47)



1955

Figure B-1. Module Drive Adapter Flowcharts (Sheet 22 of 47)

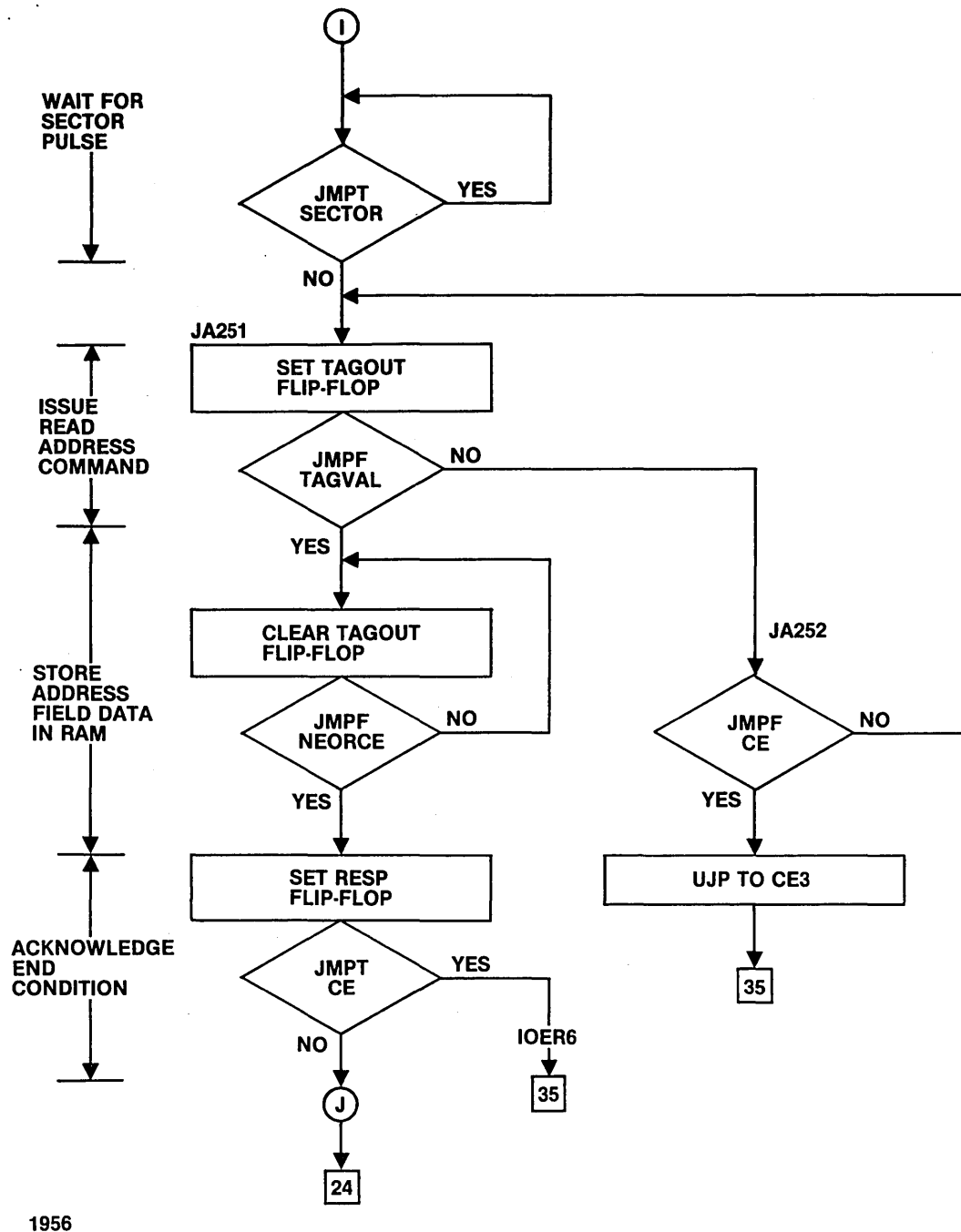
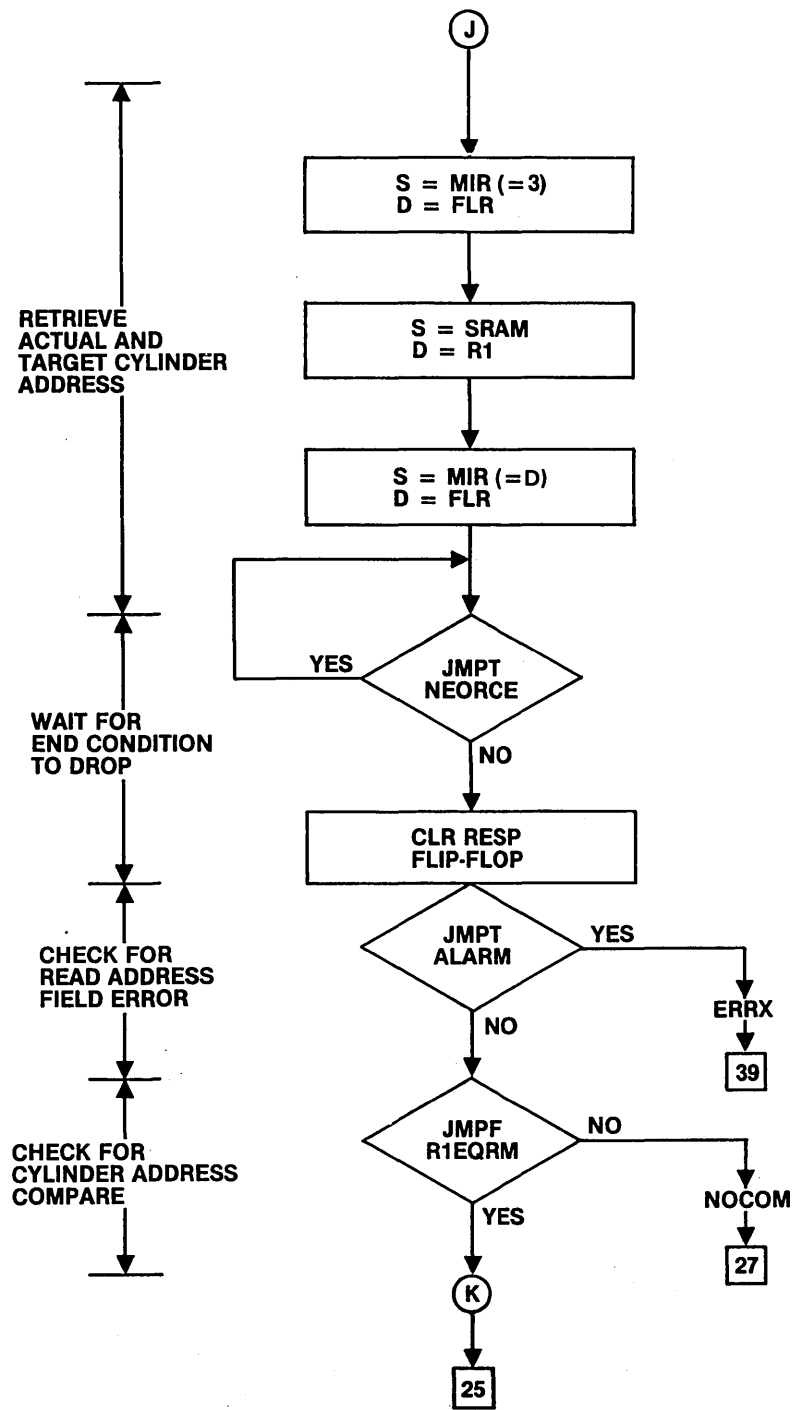
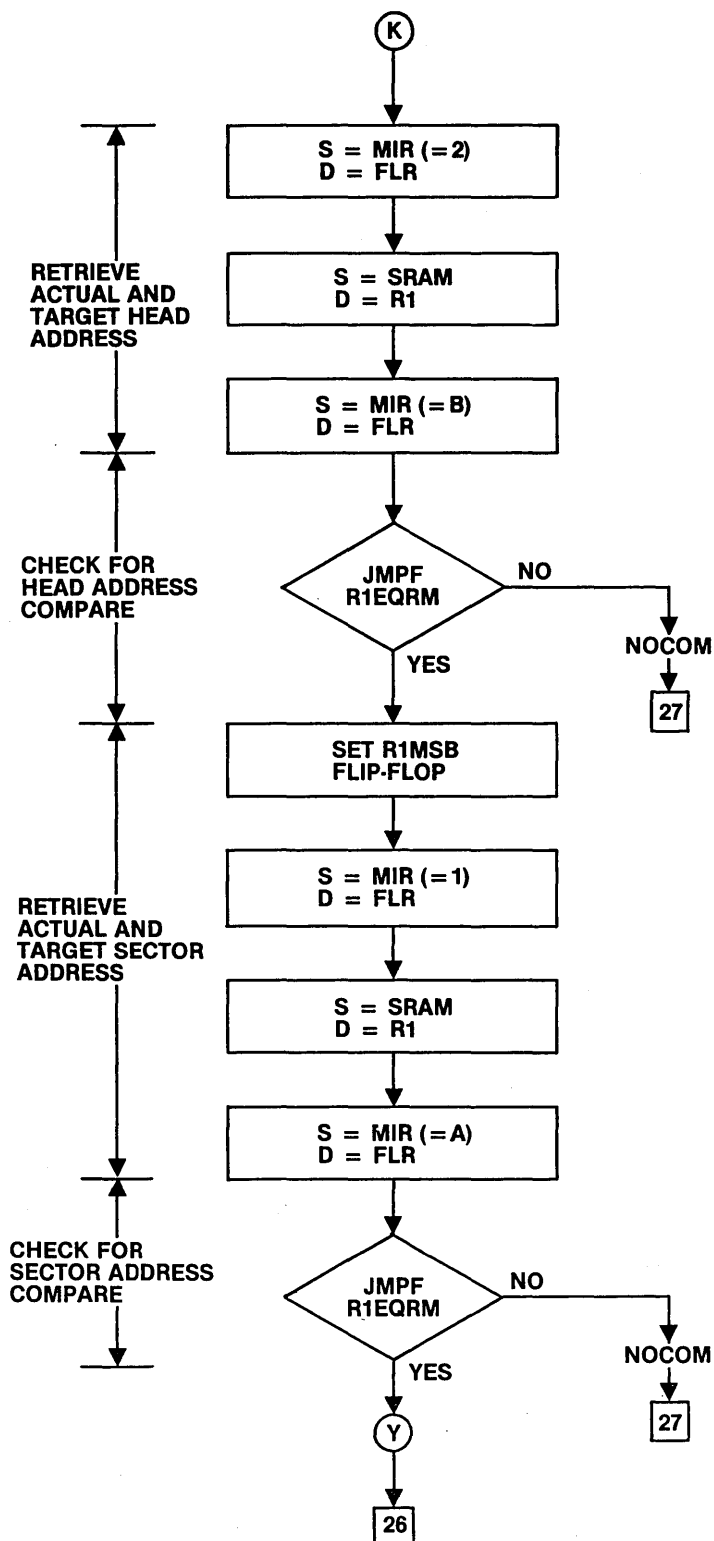


Figure B-1. Module Drive Adapter Flowcharts (Sheet 23 of 47)



1957

Figure B-1. Module Drive Adapter Flowcharts (Sheet 24 of 47)



1958

Figure B-1. Module Drive Adapter Flowcharts (Sheet 25 of 47)

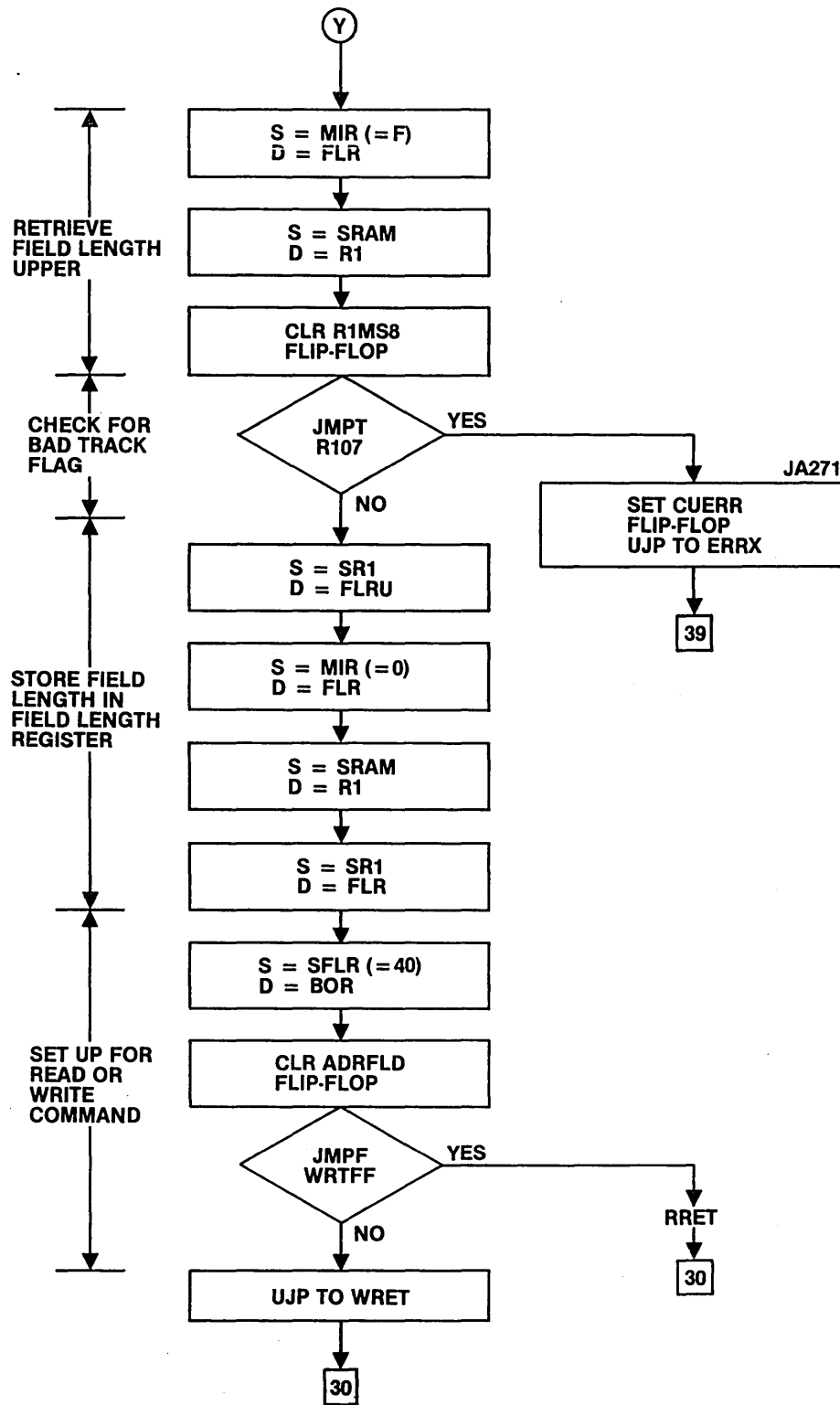


Figure B-1. Module Drive Adapter Flowcharts (Sheet 26 of 47)

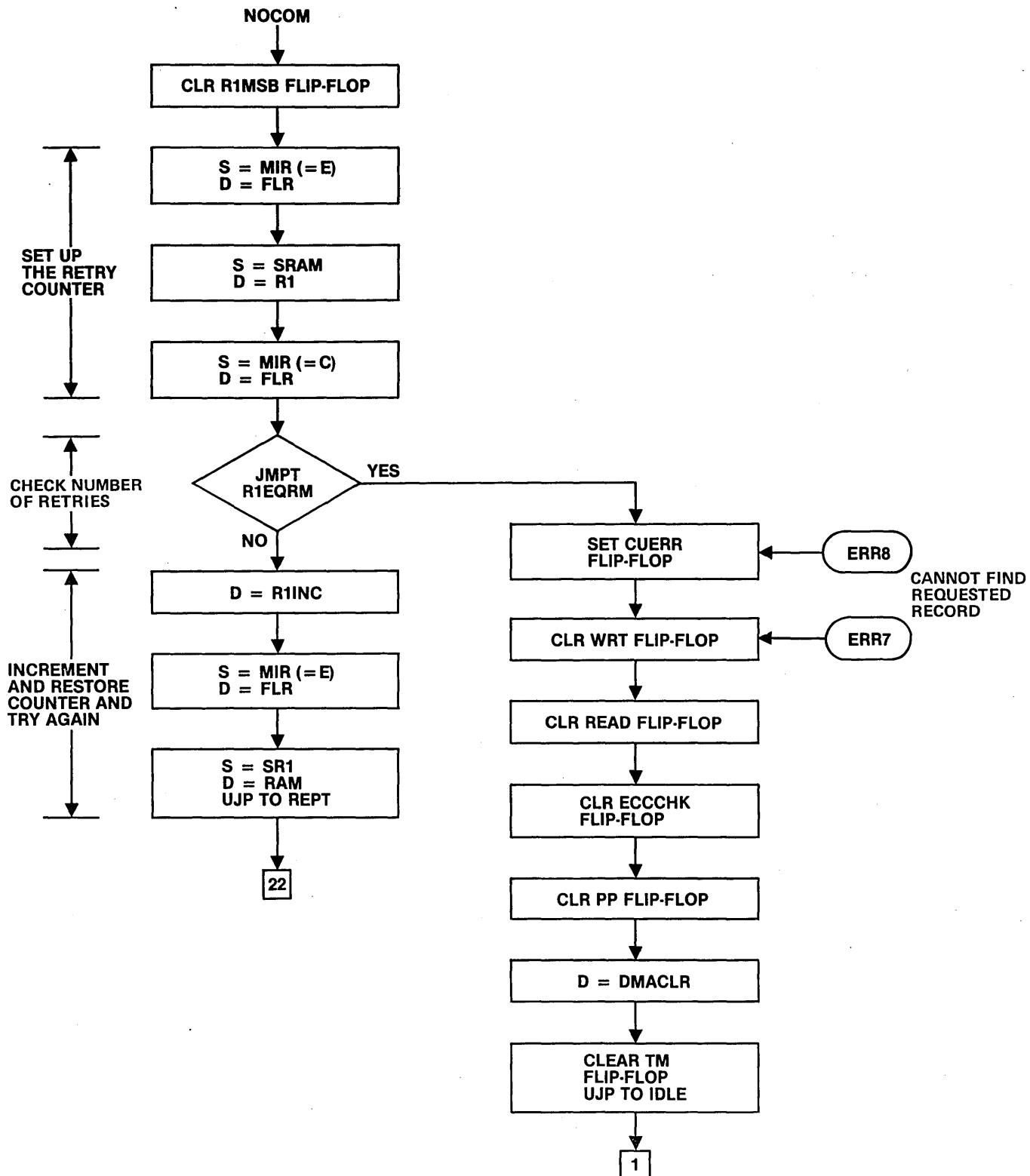


Figure B-1. Module Drive Adapter Flowcharts (Sheet 27 of 47)

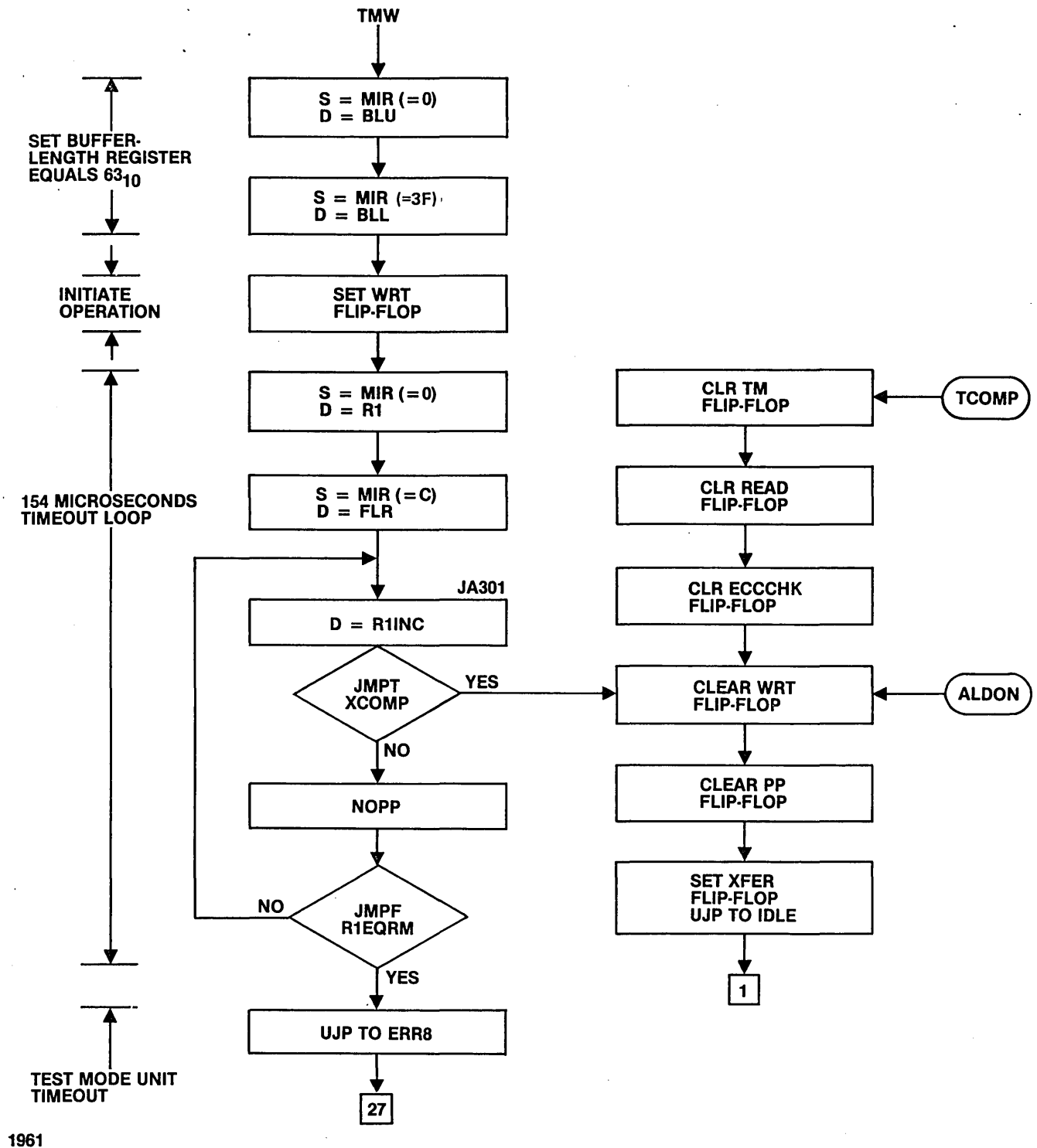


Figure B-1. Module Drive Adapter Flowcharts (Sheet 28 of 47)

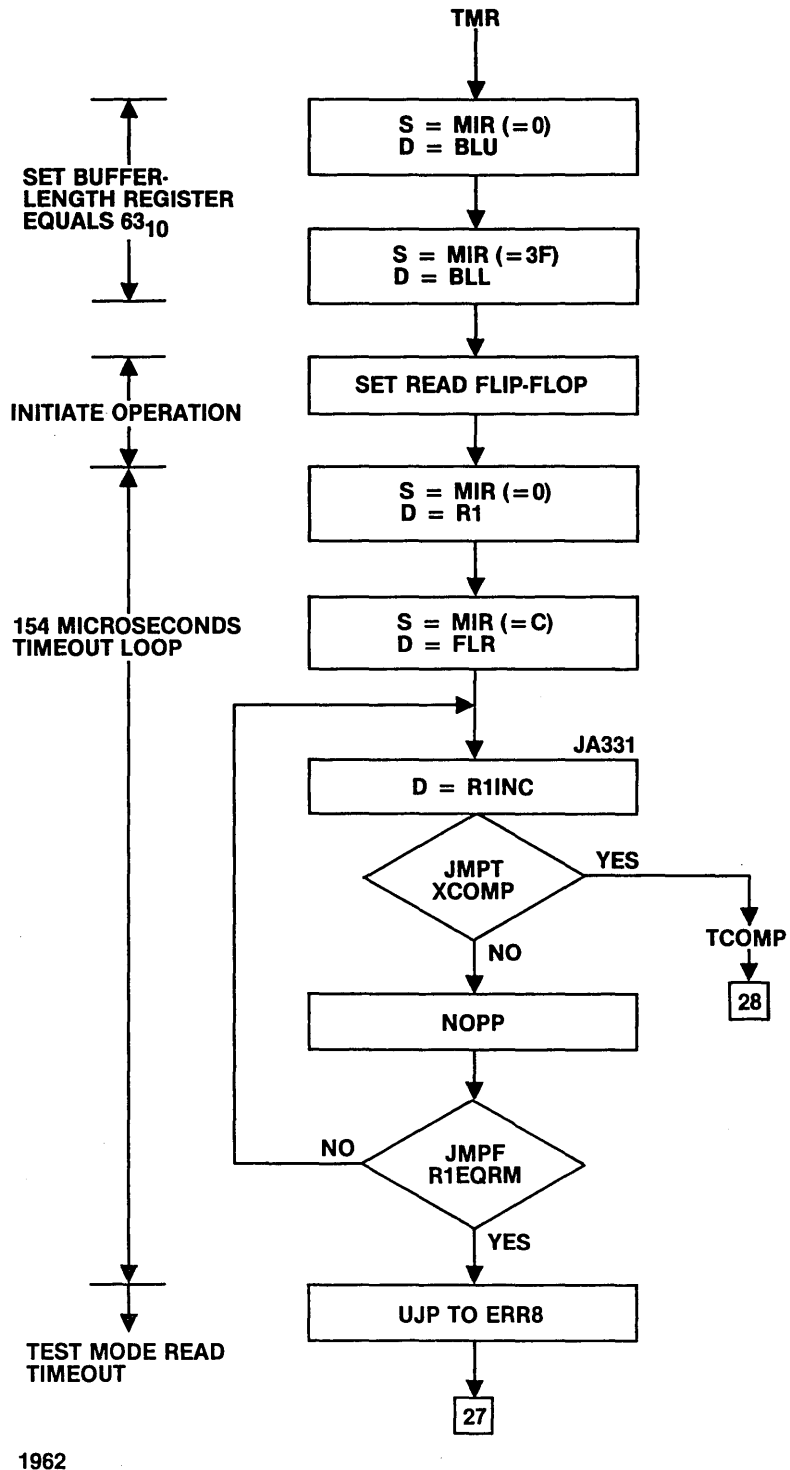
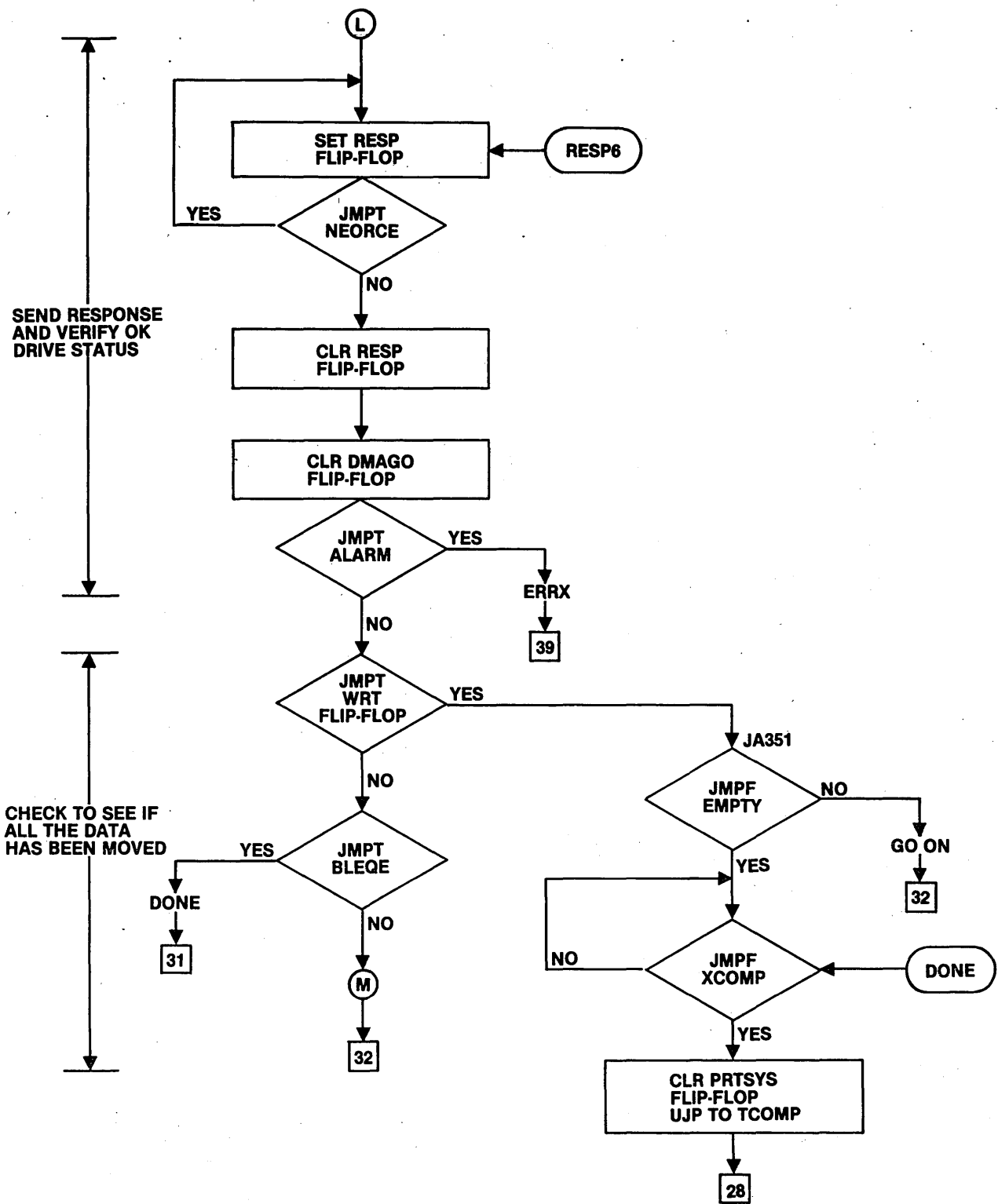
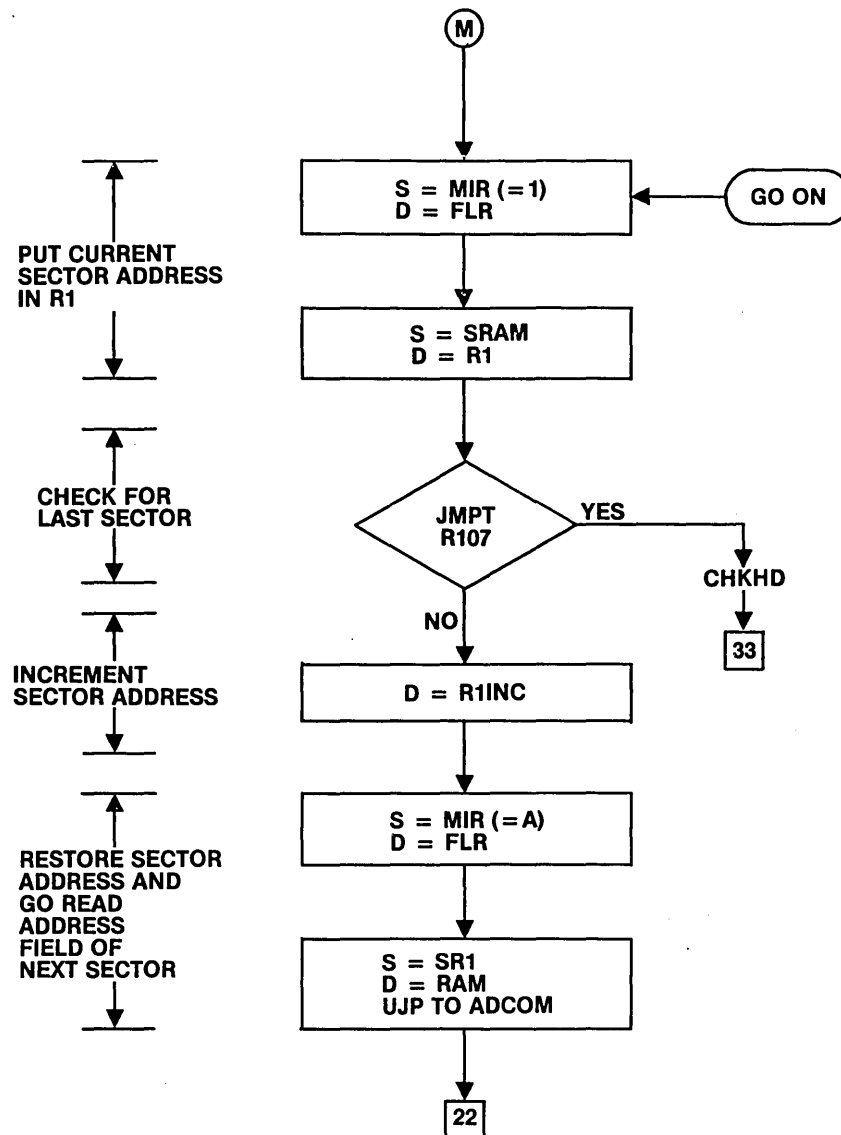


Figure B-1. Module Drive Adapter Flowcharts (Sheet 29 of 47)



1964

Figure B-1. Module Drive Adapter Flowcharts (Sheet 31 of 47)



1965

Figure B-1. Module Drive Adapter Flowcharts (Sheet 32 of 47)

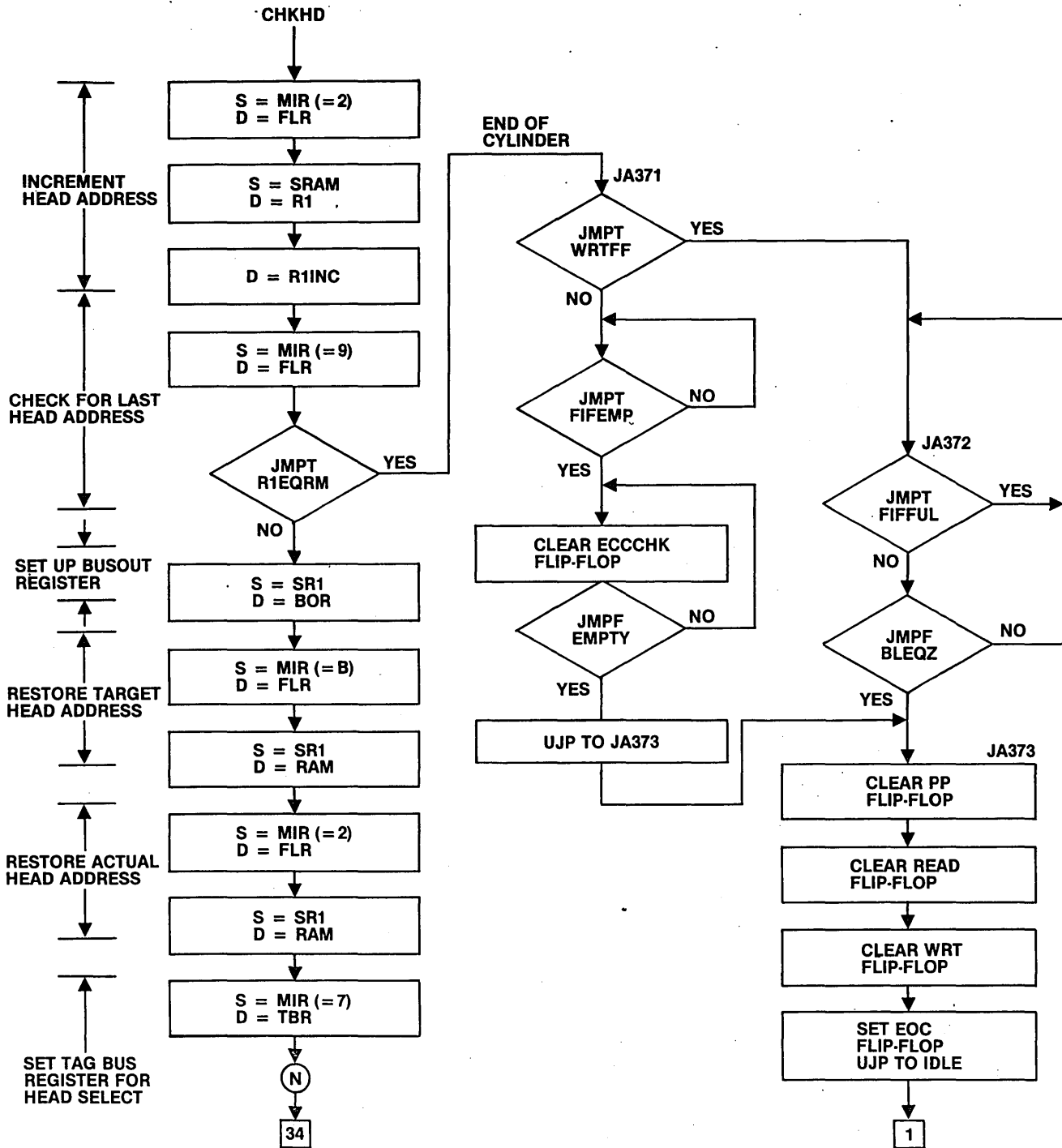
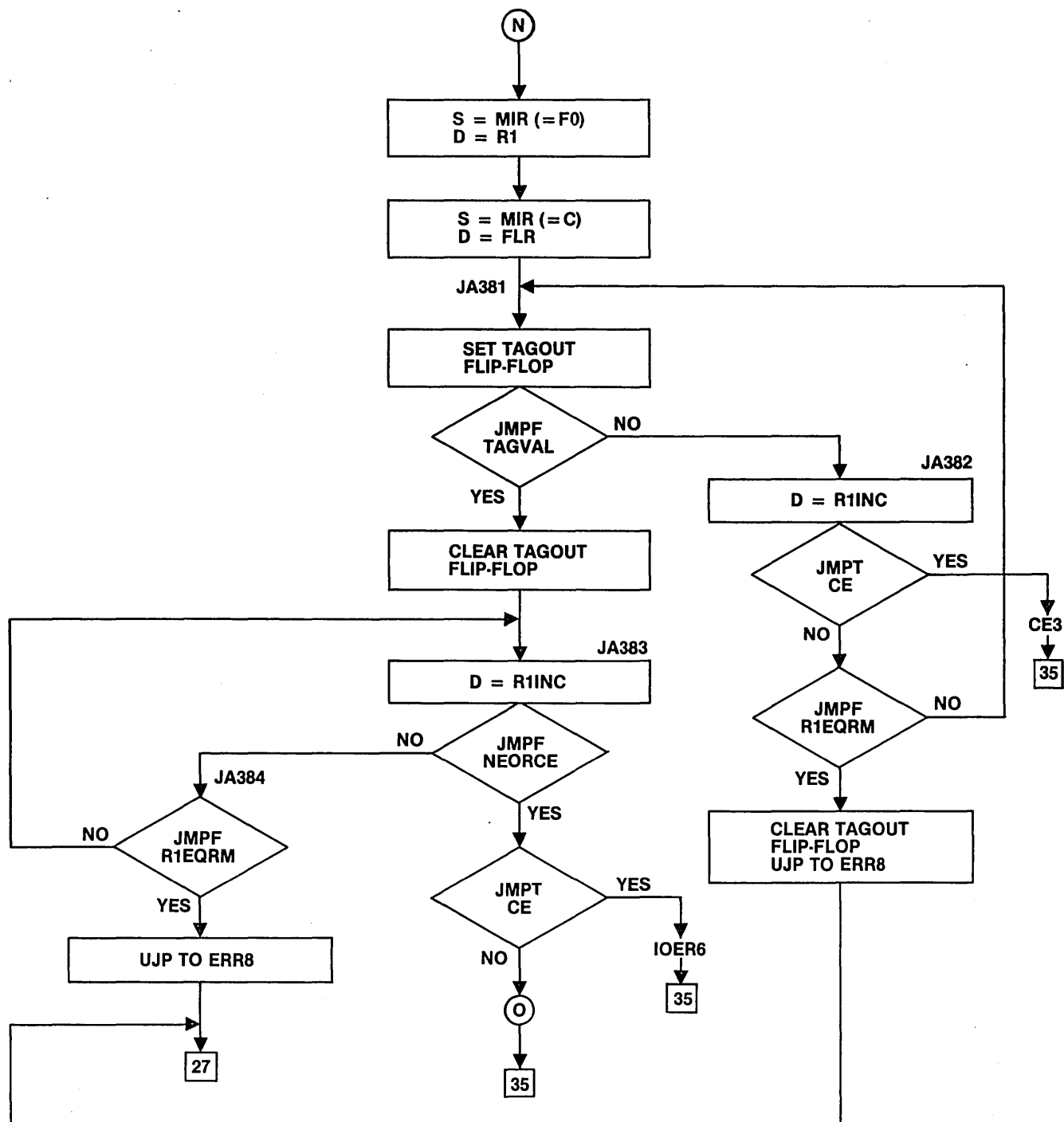
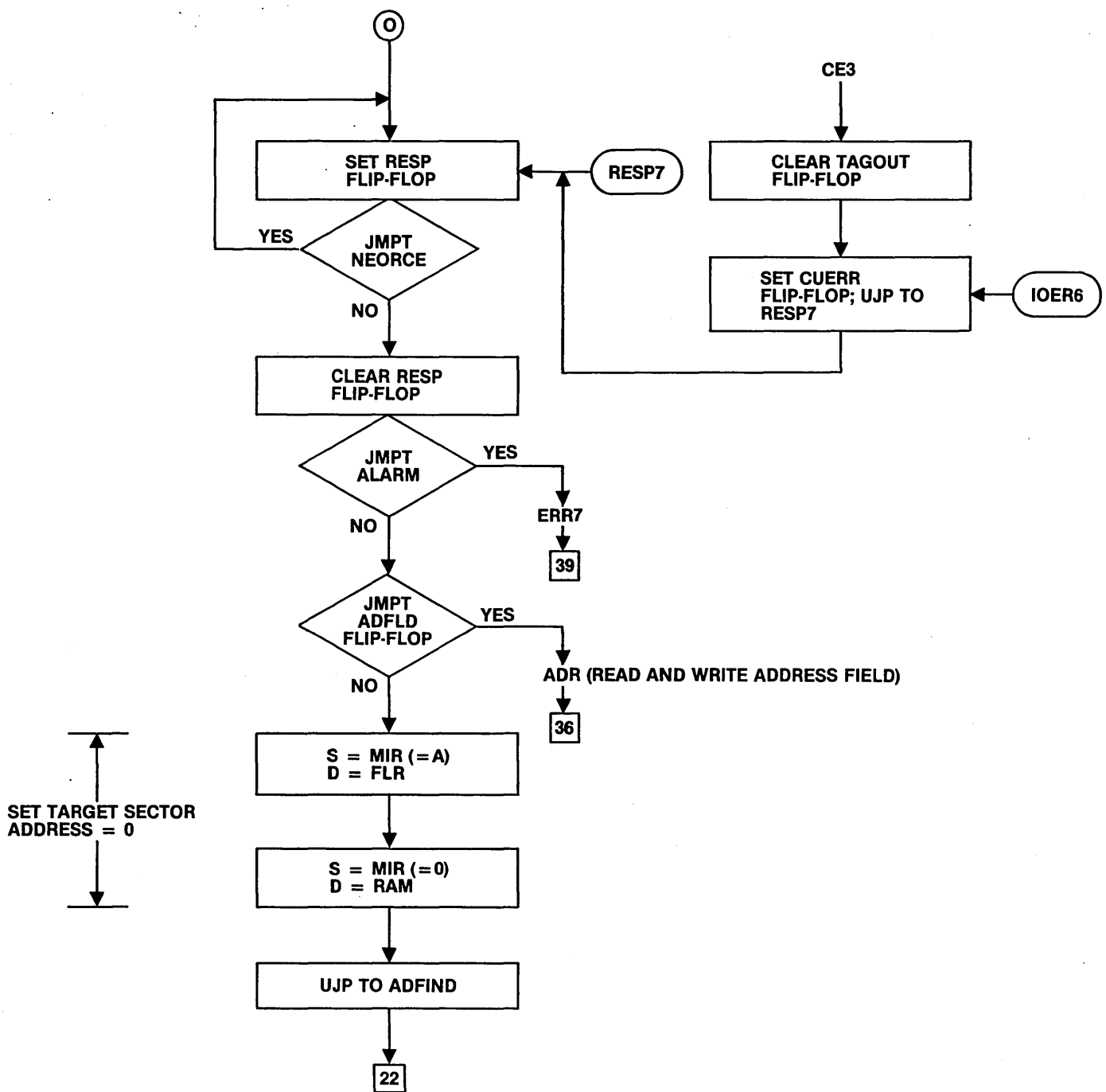


Figure B-1. Module Drive Adapter Flowcharts (Sheet 33 of 47)



1967

Figure B-1. Module Drive Adapter Flowcharts (Sheet 34 of 47)



1968

Figure B-1. Module Drive Adapter Flowcharts (Sheet 35 of 47)

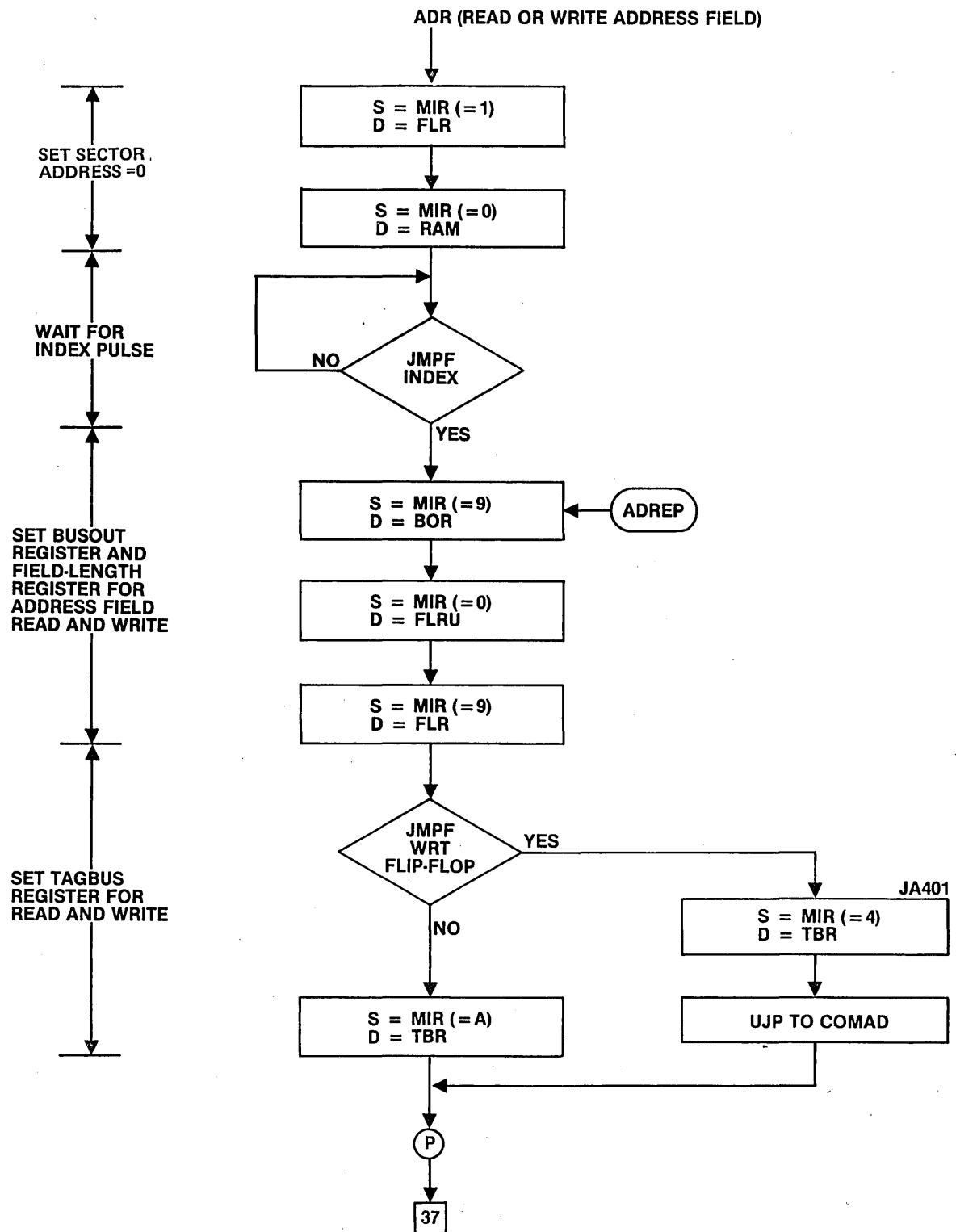
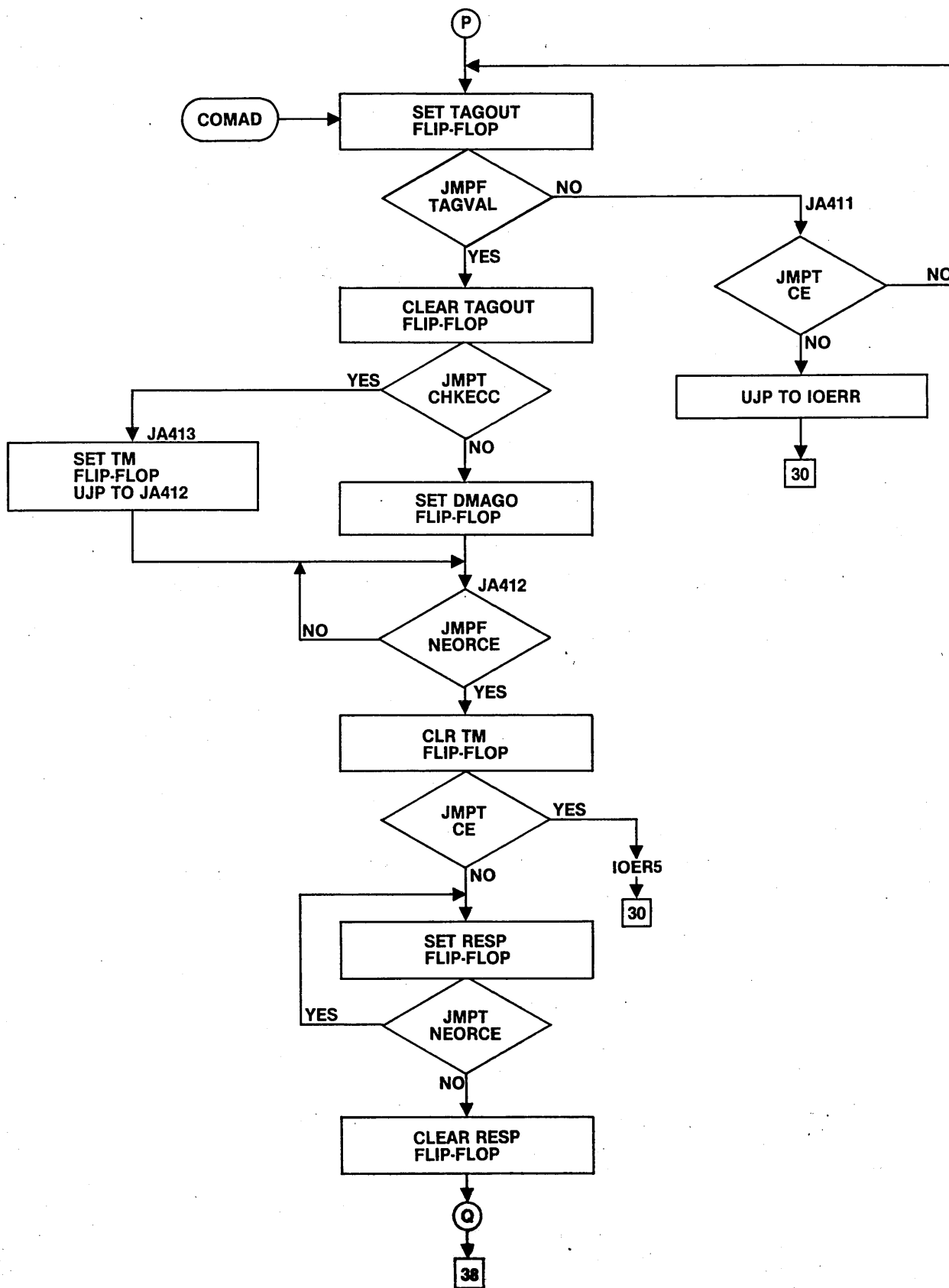
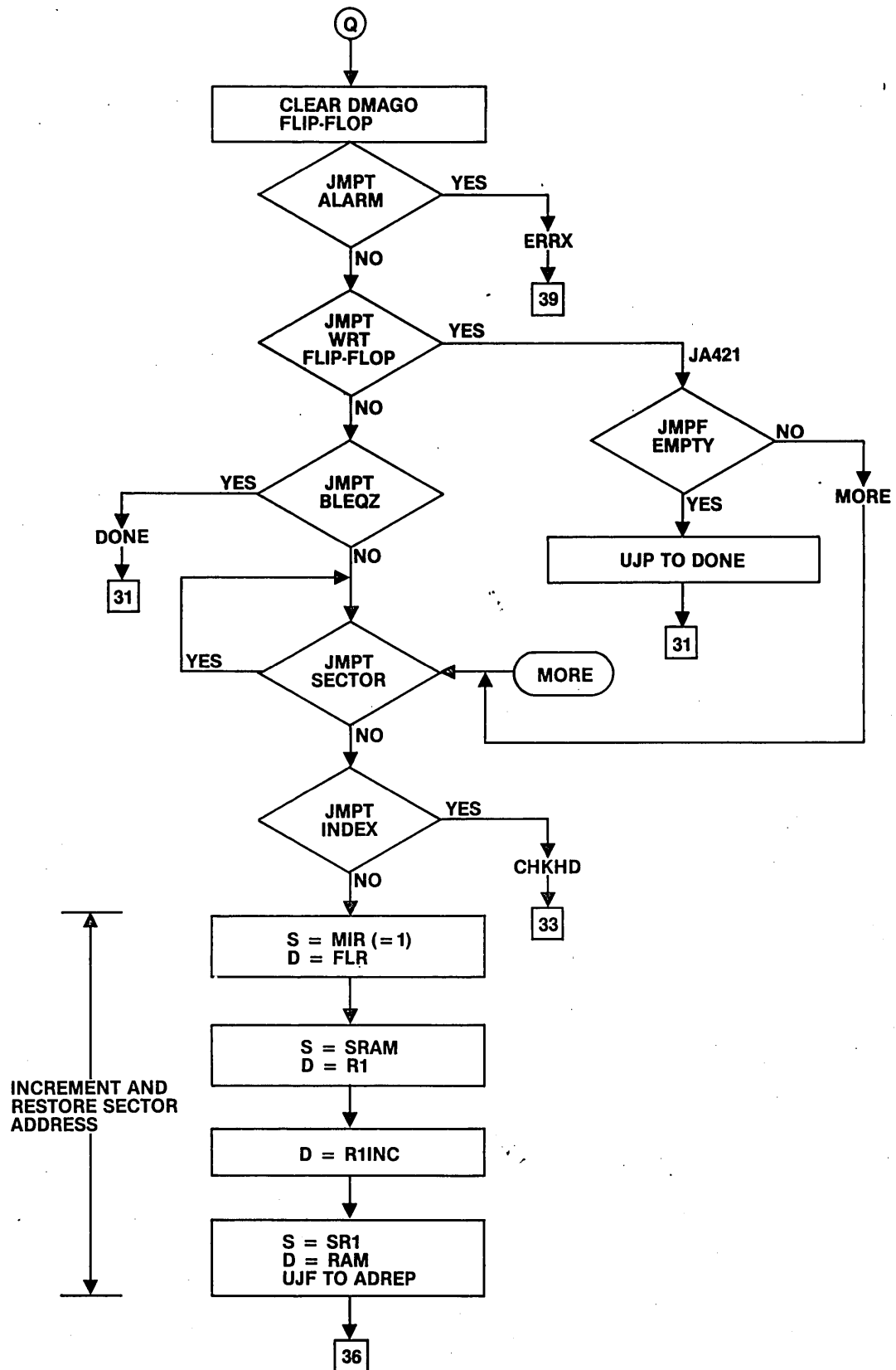


Figure B-1. Module Drive Adapter Flowcharts (Sheet 36 of 47)



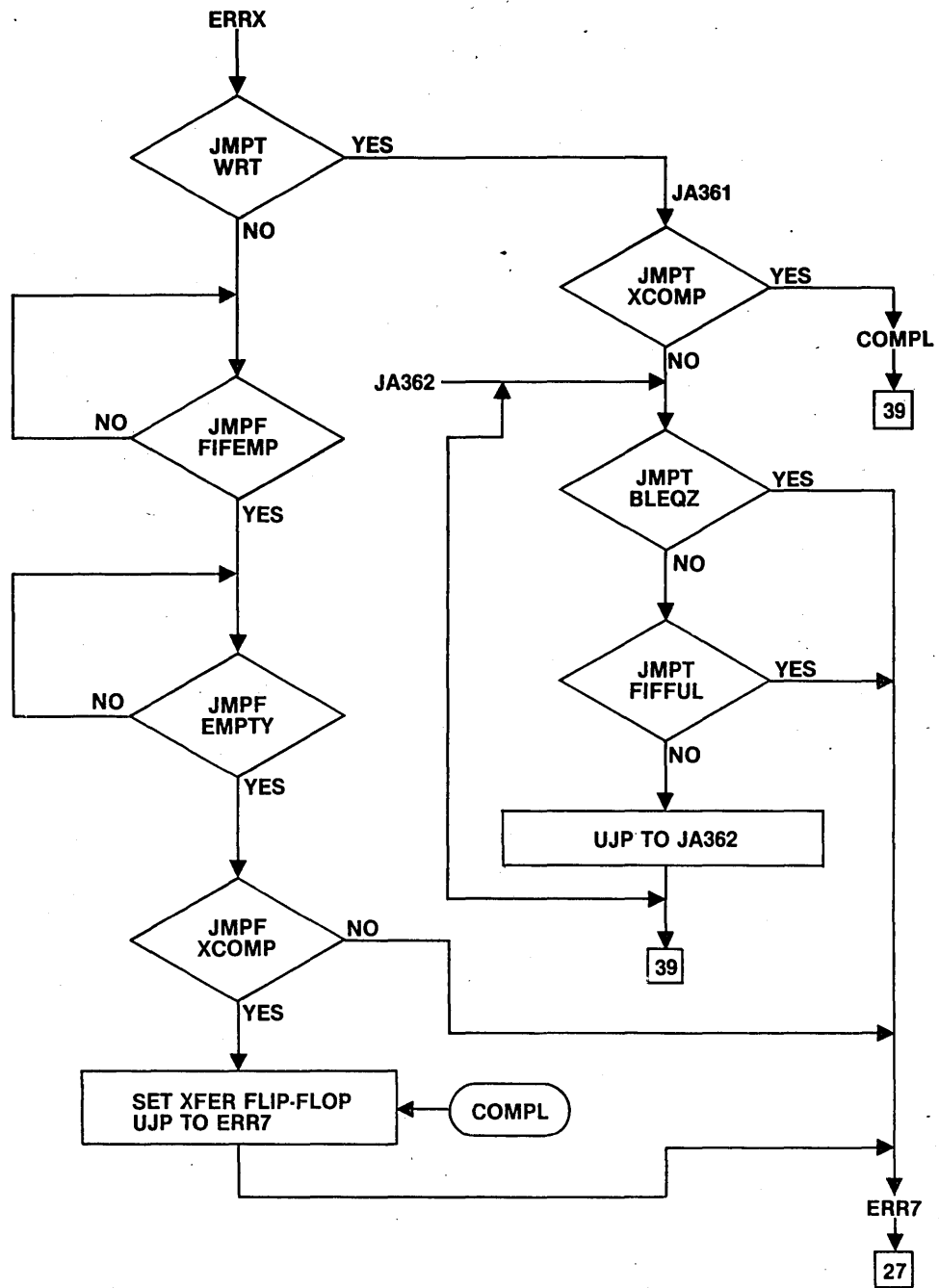
1970

Figure B-1. Module Drive Adapter Flowcharts (Sheet 37 of 47)



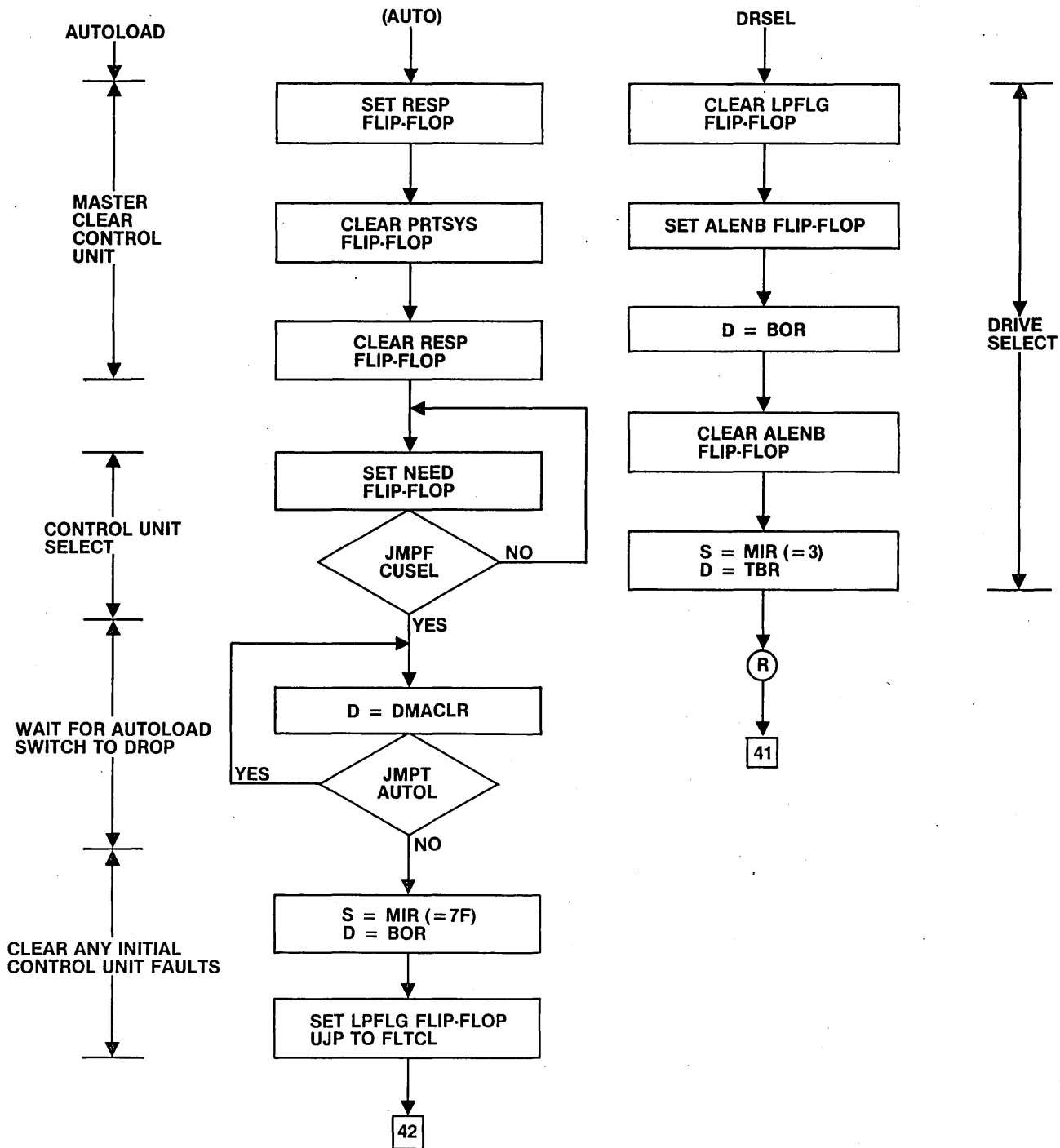
1971

Figure B-1. Module Drive Adapter Flowcharts (Sheet 38 of 47)



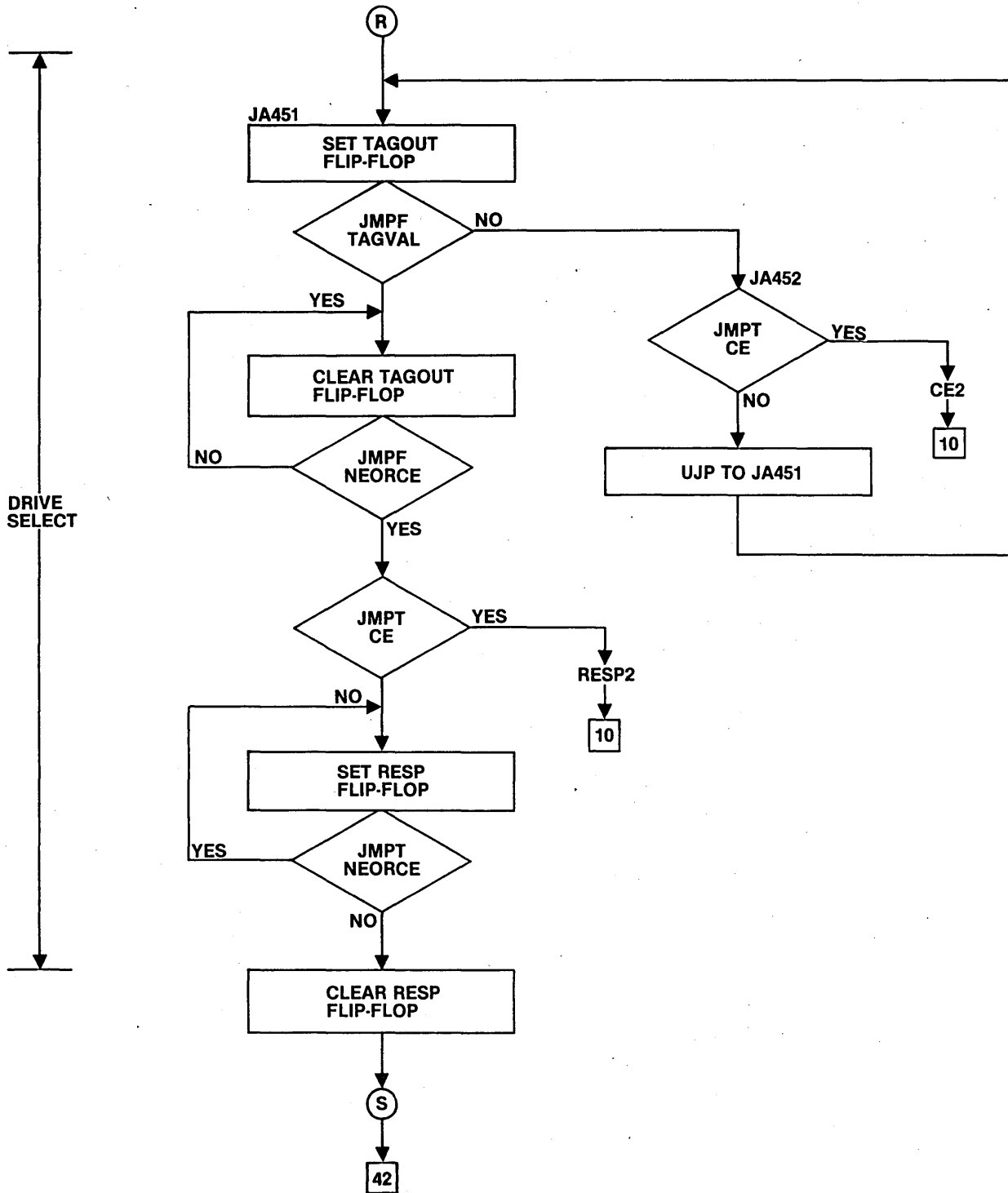
1972

Figure B-1. Module Drive Adapter Flowcharts (Sheet 39 of 47)



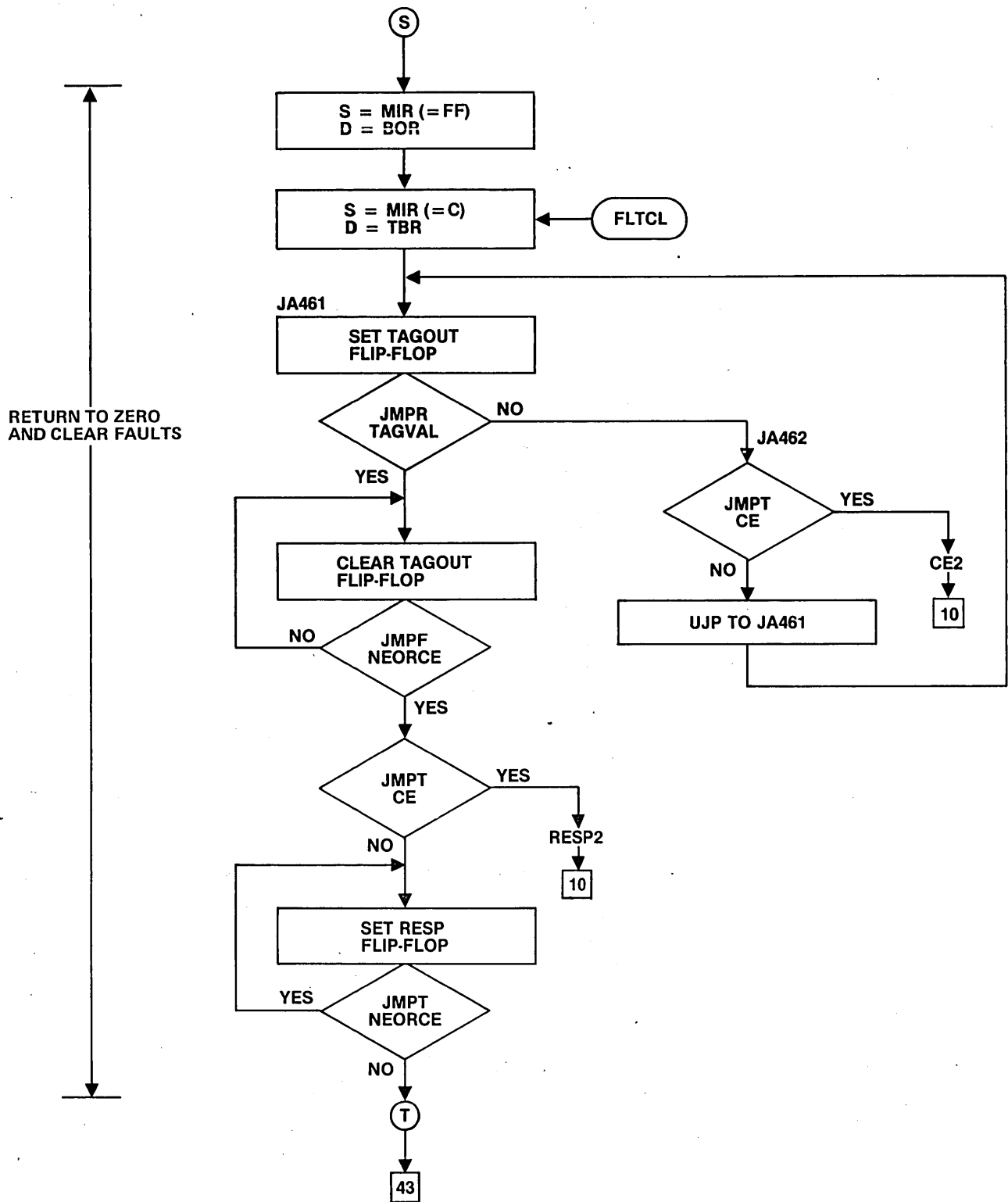
1973

Figure B-1. Module Drive Adapter Flowcharts (Sheet 40 of 47)



1974

Figure B-1. Module Drive Adapter Flowcharts (Sheet 41 of 47)



1975

Figure B-1. Module Drive Adapter Flowcharts (Sheet 42 of 47)

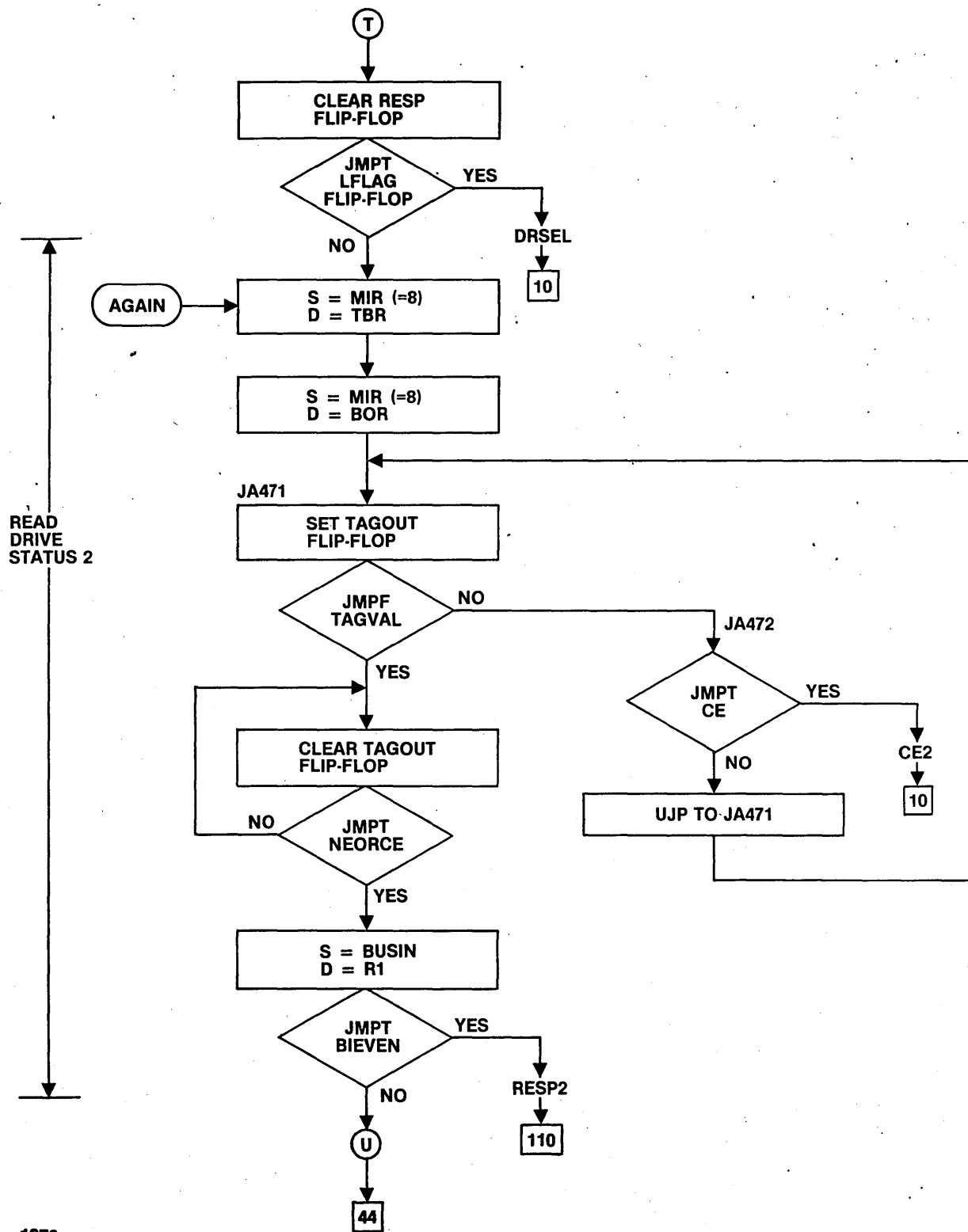


Figure B-1. Module Drive Adapter Flowcharts (Sheet 43 of 47)

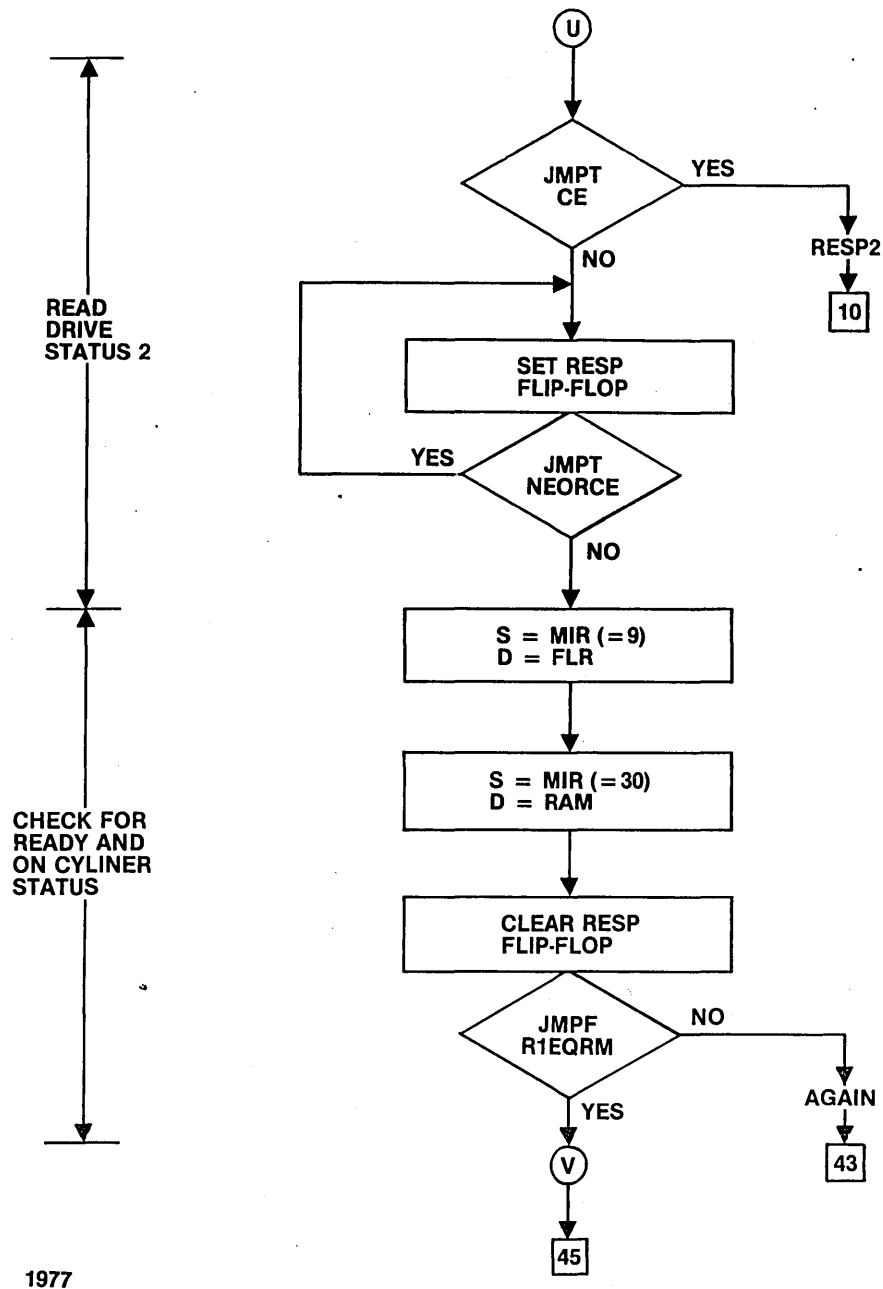
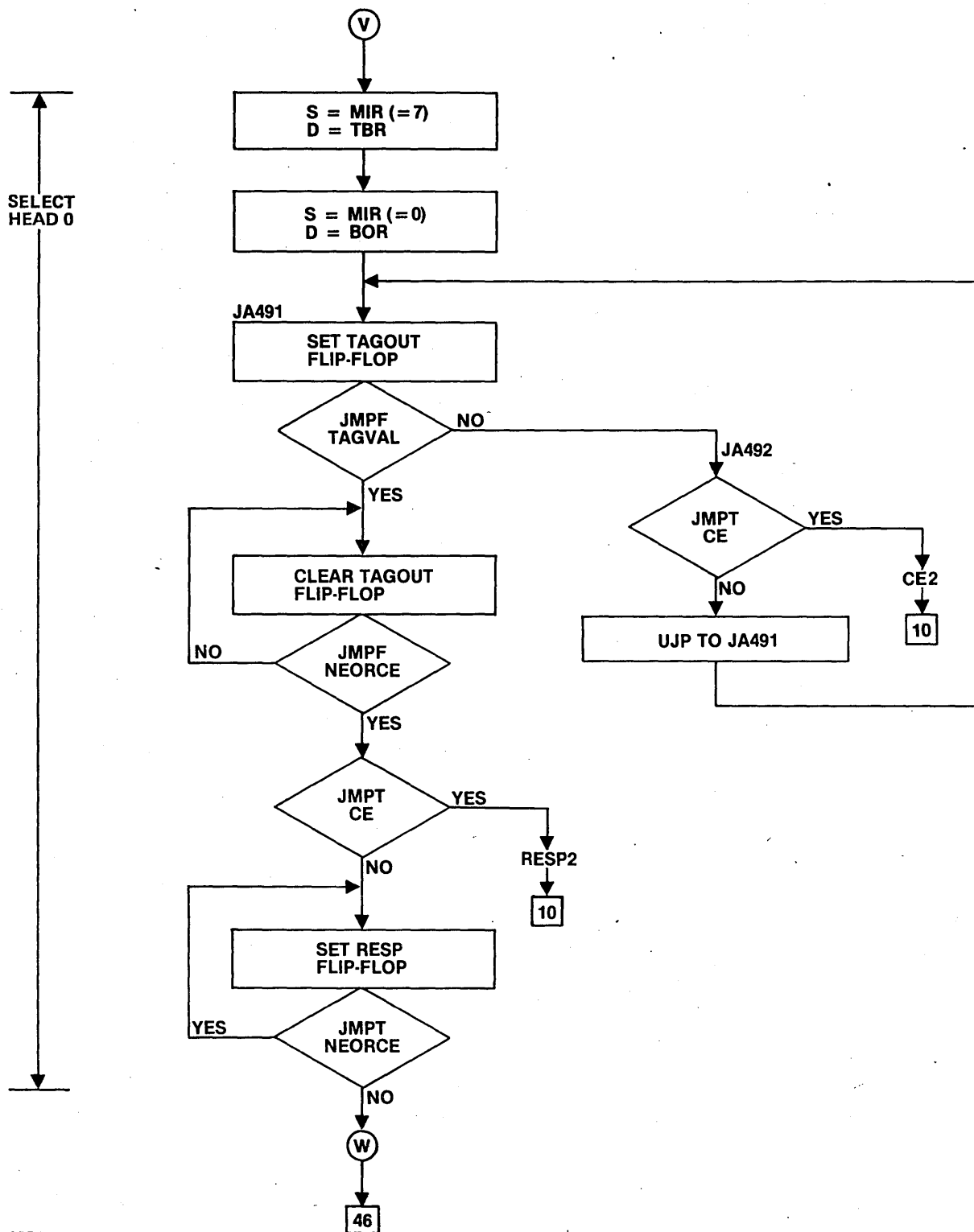
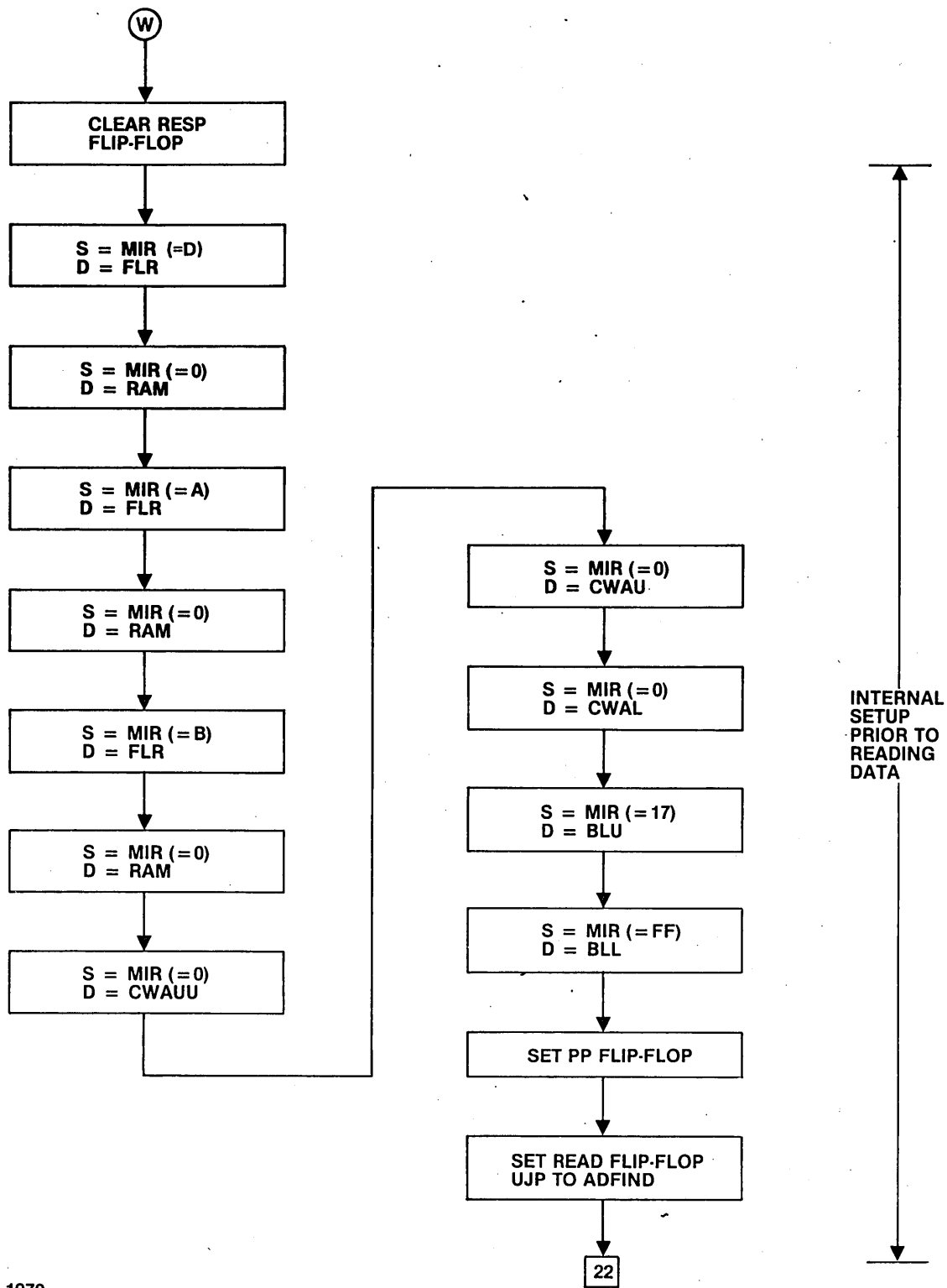


Figure B-1. Module Drive Adapter Flowcharts (Sheet 44 of 47)



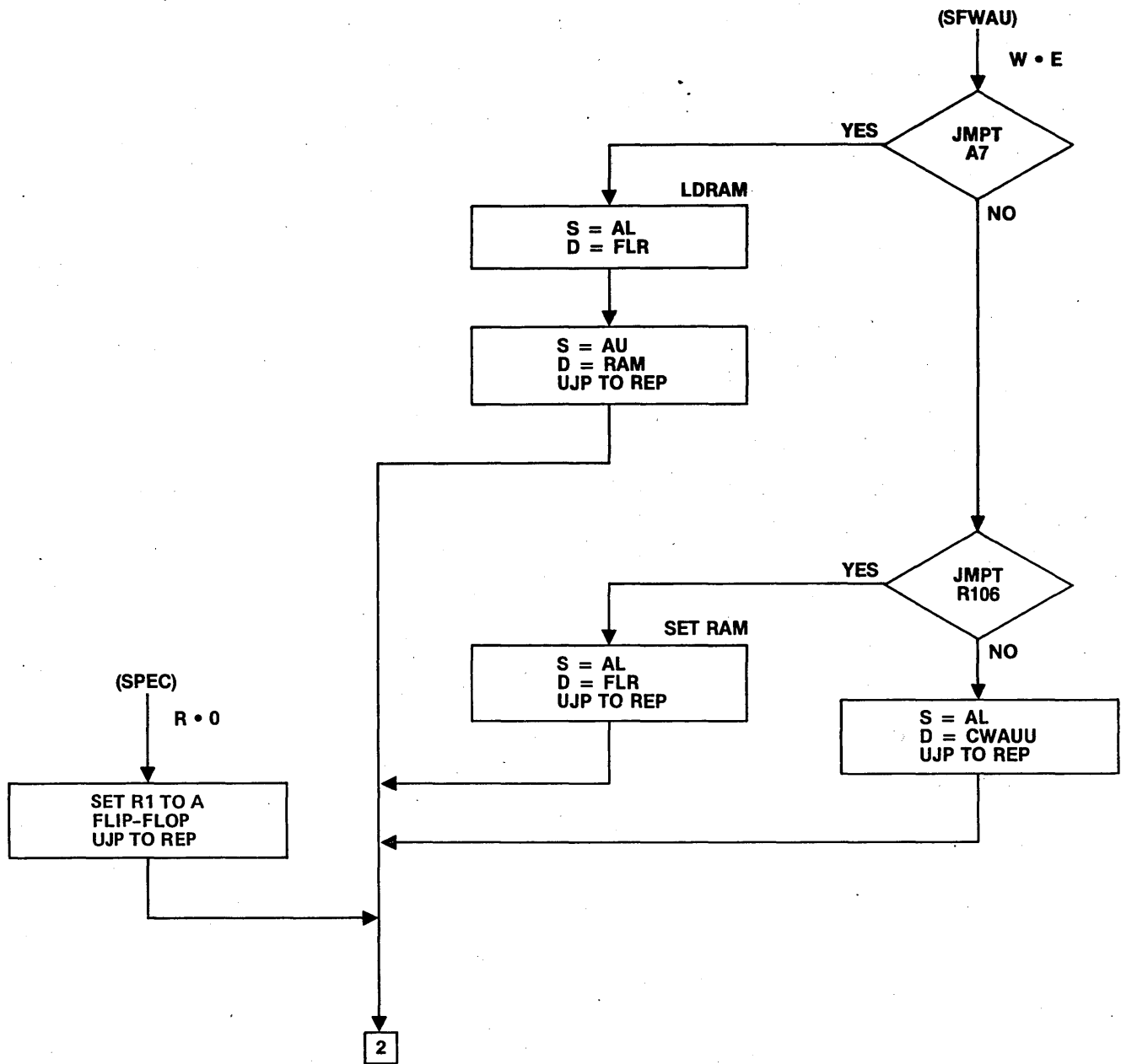
1978

Figure B-1. Module Drive Adapter Flowcharts (Sheet 45 of 47)



1979

Figure B-1. Module Drive Adapter Flowcharts (Sheet 46 of 47)



1980

Figure B-1. Module Drive Adapter Flowcharts (Sheet 47 of 47)

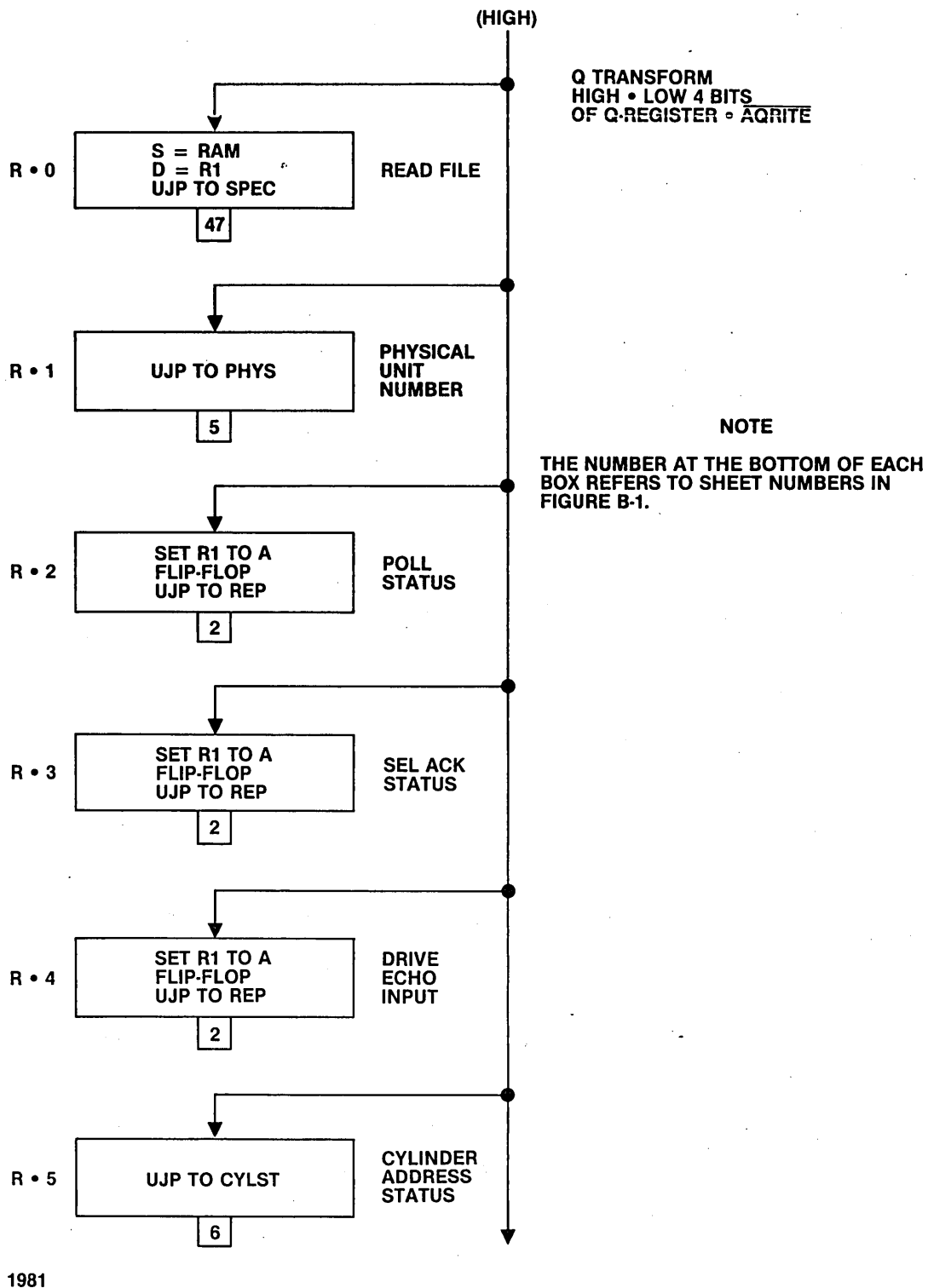
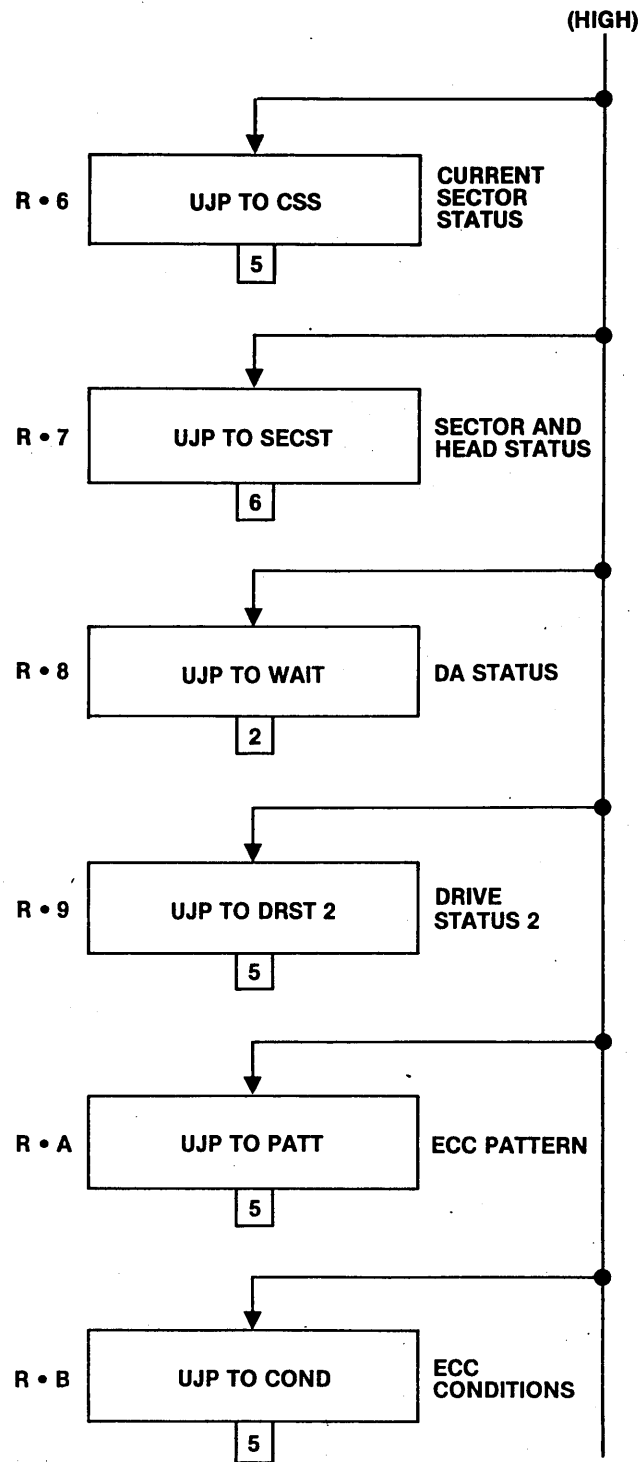
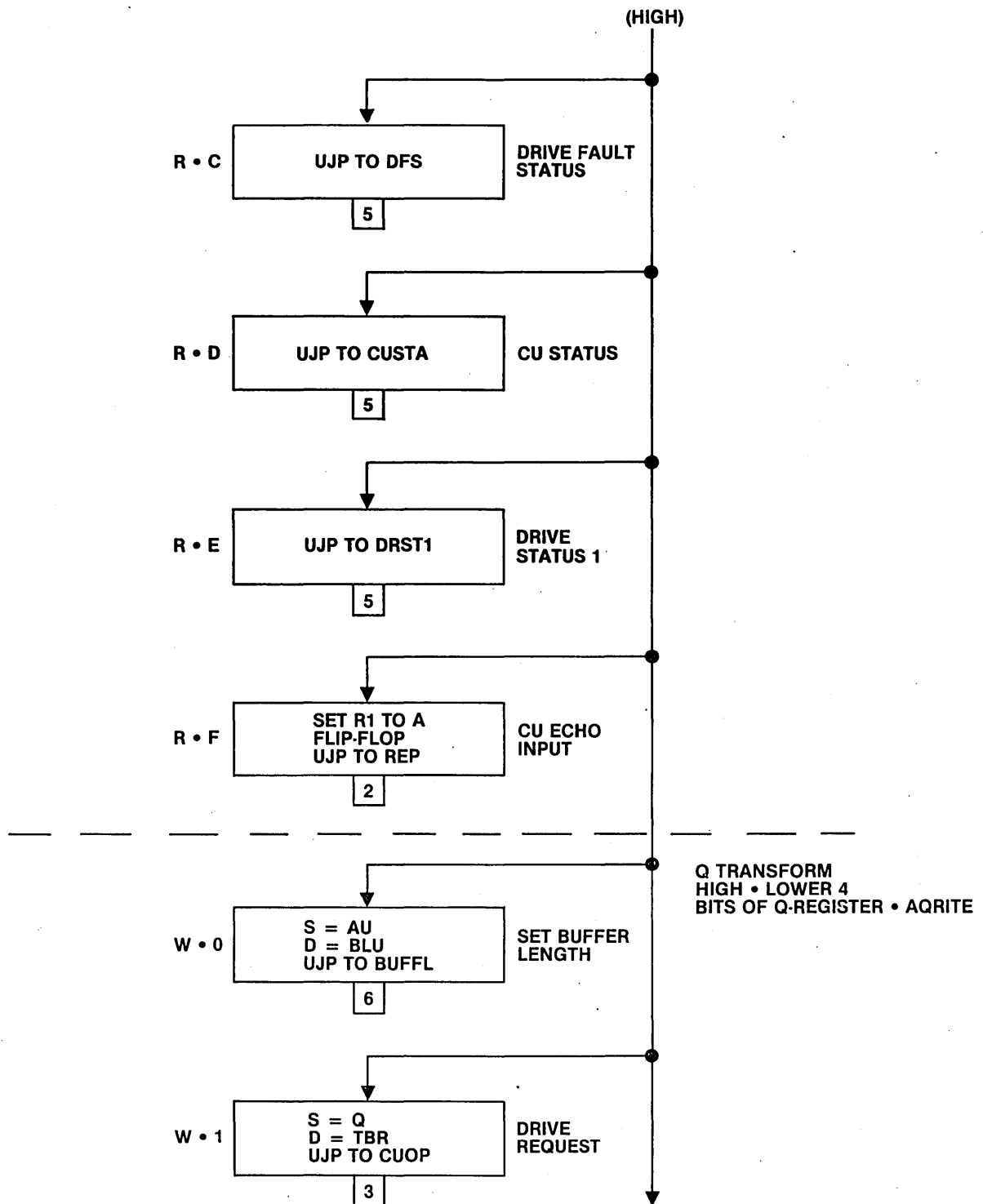


Figure B-2. Transform Jump Table (Sheet 1 of 6)



1982

Figure B-2. Transform Jump Table (Sheet 2 of 6)



1983

Figure B-2. Transform Jump Table (Sheet 3 of 6)

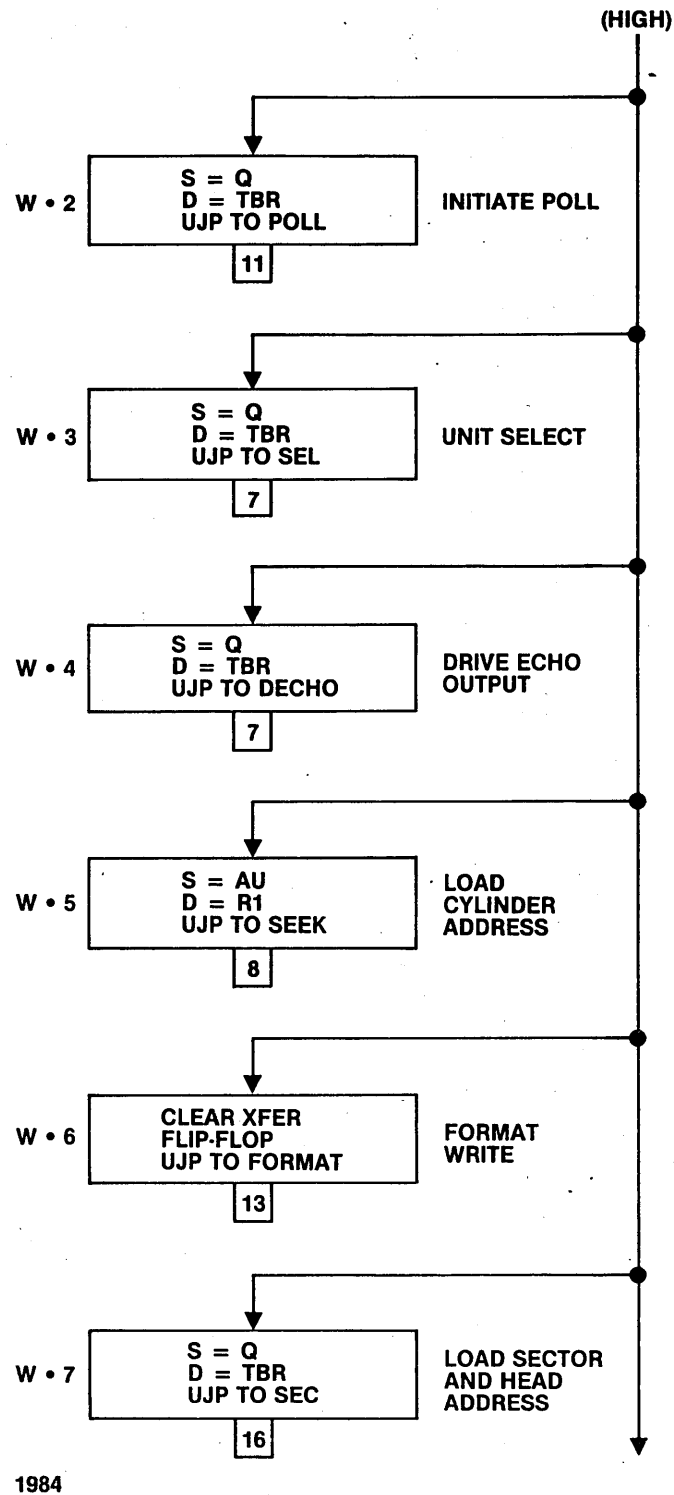
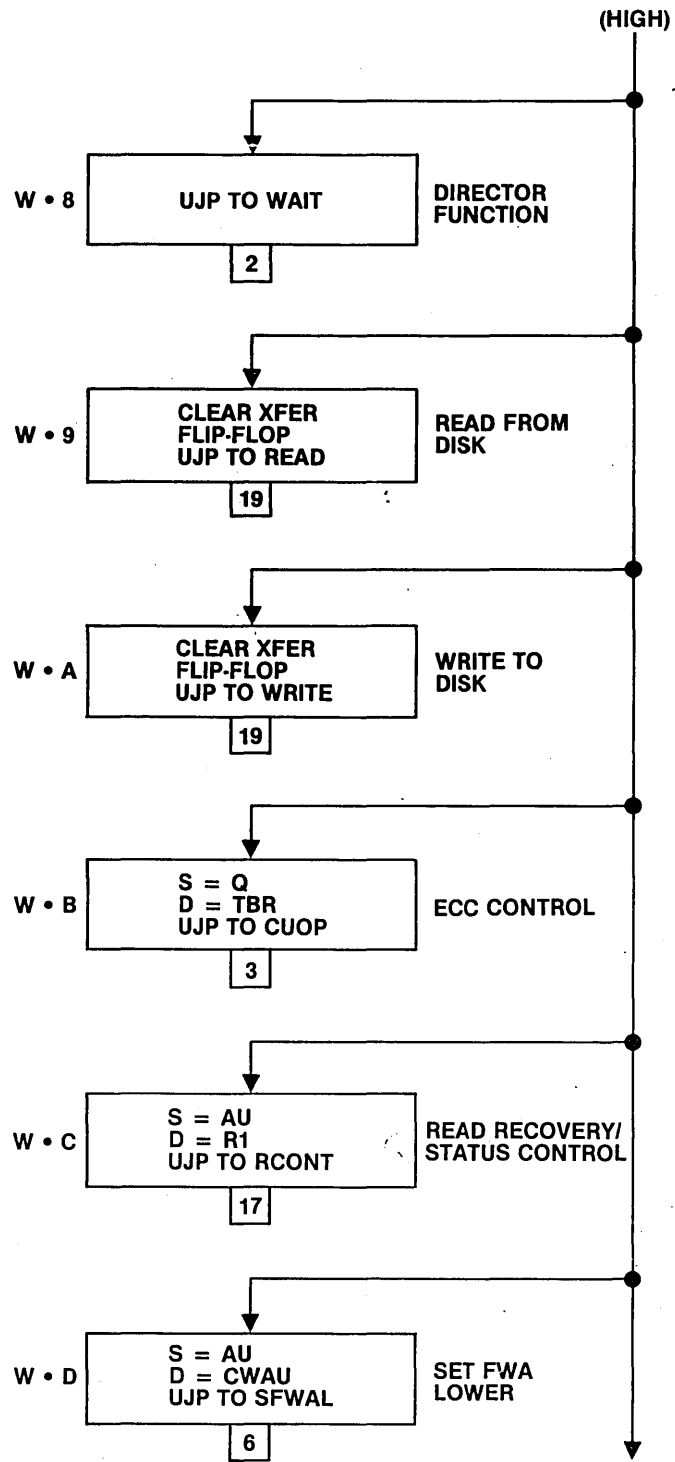
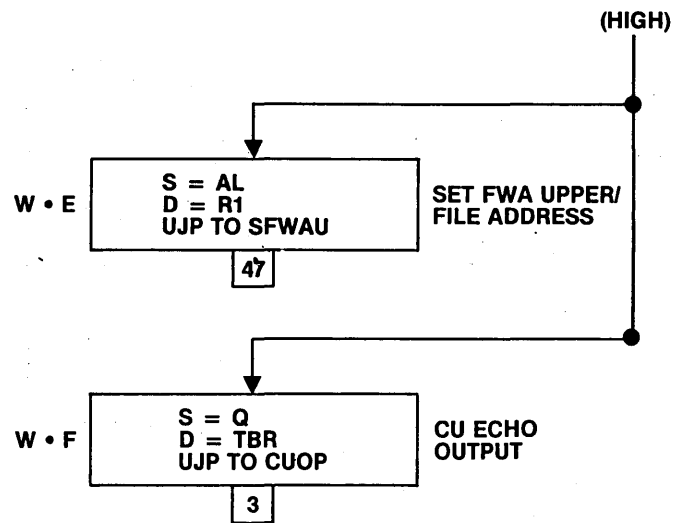


Figure B-2. Transform Jump Table (Sheet 4 of 6)



1985

Figure B-2. Transform Jump Table (Sheet 5 of 6)



1986

Figure B-2. Transform Jump Table (Sheet 6 of 6)

C

JOE,HMS,MP17 MINI,MAXI,STANDARD MODULE DISK I/F FIRMWARE
1700.MASS STORAGE OPERATING SYSTEM VERSION 5.0 DATE OF RUN: 04/01/80 SYSTEM ID: LJOLOS HOUSE 4 DEC 79 MSOS 5 (12/06/79)

[illegible]

```

0001      NAM DISK
0002      SEQSD MAC S,D,DD
0003      VFD X8/* /2-V,N7/0,N1/1,
0004      VFD X3/'S',,X4/'D',,X9/'DD'
0005      EMC
0006      SEQFF MAC M,F
0007      VFD X8/* /2-V,N6/0,N1/1,X1/'M',
0008      VFD N2/0,X5/'F',,N9/0
0009      EMC
0010      UJP MAC JA
0011      VFD X8/* /2-V,N1/1,N7/0,
0012      VFD N7/0,X9/'JA' /2-V
0013      EMC
0014      UJPSD MAC S,D,JA
0015      VFD X8/* /2-V,N1/1,N6/0,N1/1,
0016      VFD X3/'S',,X4/'D',,X9/'JA' /2-V
0017      EMC
0018      UJPPF MAC M,F,JA
0019      VFD X8/* /2-V,N1/1,N5/0,N1/1,X1/'M',
0020      VFD N2/0,X5/'F',,X9/'JA' /2-V
0021      EMC
0022      JMPF MAC JC,JA
0023      VFD X8/* /2-V,N1/0,X5/'JC',,N2/0,
0024      VFD N7/0,X9/'JA' /2-V
0025      EMC
0026      JMPFSD MAC JC,S,D,JA
0027      VFD X8/* /2-V,N1/0,X5/'JC',,N1/0,N1/1,
0028      VFD X3/'S',,X4/'D',,X9/'JA' /2-V
0029      EMC
0030      JMPFFF MAC JC,M,F,JA
0031      VFD X8/* /2-V,N1/0,X5/'JC',,N1/1,X1/'M',
0032      VFD N2/0,X5/'F',,X9/'JA' /2-V
0033      EMC
0034      JMPT MAC JC,JA
0035      VFD X8/* /2-V,N1/1,X5/'JC',,N2/0,
0036      VFD N7/0,X9/'JA' /2-V
0037      EMC
0038      JMPTSD MAC JC,S,D,JA
0039      VFD X8/* /2-V,N1/1,X5/'JC',,N1/0,N1/1,
0040      VFD X3/'S',,X4/'D',,X9/'JA' /2-V
0041      EMC
0042      JMPTFF MAC JC,M,F,JA
0043      VFD X8/* /2-V,N1/1,X5/'JC',,N1/1,X1/'M',
0044      VFD N2/0,X5/'F',,X9/'JA' /2-V
0045      EMC
0046      NOPP MAC
0047      VFD X8/* /2-V,N3/0,
0048      VFD N15/0
0049      EMC

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0051      *   S FIELD (SOURCE) EQUATES
0052      *
0053      0000      EQU   BUSIN(0)      BUS IN
0054      0001      EQU   MIR(1)       MIR BITS 0-7
0055      0002      EQU   SR1(2)       R1 REGISTER
0056      0003      EQU   SRAM(3)      8 X 16 FILE
0057      0004      EQU   SFLR(4)      FLR BITS 0-3 AND MIR BITS 4-7
0058      0005      EQU   Q(5)         Q BITS 0-3
0059      0006      EQU   AL(6)        A REGISTER BITS 0-7
0060      0007      EQU   AU(7)        A REGISTER BITS 8-15
0061      *
0062      *
0063      *
0064      *   D FIELD (DESTINATION) EQUATES
0065      *
0066      0000      EQU   R1(00)       R1 REGISTER
0067      0001      EQU   FLR(01)      FIELD LENGTH REGISTER
0068      0002      EQU   FLRU(02)     FIELD LENGTH REGISTER UPPER
0069      0003      EQU   BLL(03)      BUFFER LENGTH LOWER (0-7)
0070      0004      EQU   BLU(04)      BUFFER LENGTH UPPER (8-15)
0071      0005      EQU   CWAL(05)     CURRENT WORD ADDR REG (0-7)
0072      0006      EQU   CWAU(06)     CURRENT WORD ADDR REG (8-15)
0073      0007      EQU   CWAUU(07)    CURRENT WORD ADDR REG (16-17)
0074      0008      EQU   TBR(08)     TAG BUS REGISTER
0075      0009      EQU   BOR(09)     BUS OUT REGISTER
0076      000A      EQU   RAM(10)      8 X 16 FILE
0077      000B      EQU   R1INC(11)    INC R1 REG (STROBE)
0078      000C      EQU   BLDEC(12)    BUFFER LENGTH REG DEC (STROBE)
0079      000D      EQU   DMACLR(13)   DMA CLEAR (STROBE)
0080      *
0081      *
0082      *
0083      *   F FIELD (FLIP FLOPS) EQUATES
0084      *
0085      0000      EQU   REPLY(00)     REPLY F/F (SET ONLY)
0086      0001      EQU   REJECT(01)    REJECT F/F (SET ONLY)
0087      0004      EQU   CUERR(04)     CU ERROR F/F (SET ONLY)
0088      0005      EQU   NEED(05)     NEED F/F (SET ONLY)
0089      0006      EQU   XFER(06)     TRANSFER COMPLETE F/F
0090      0007      EQU   EOC(07)      END OF CYLINDER F/F
0091      0008      EQU   TAGOUT(08)    TAG OUT F/F
0092      0009      EQU   RESP(09)     RESPONSE F/F
0093      000A      EQU   LPFLG(10)     LOOP FLAG F/F
0094      000B      EQU   TM(11)       TEST MODE F/F
0095      000C      EQU   WRT(12)      WRITE F/F
0096      000D      EQU   ADRFLD(13)    ADDRESS FIELD F/F
0097      000E      EQU   READ(14)     READ F/F
0098      000F      EQU   ALENB(15)    AUTOLOAD ENABLE F/F
0099      0010      EQU   BUSY(16)     BUSY F/F
0100      0011      EQU   DMA GO(17)    DMA GO F/F
0101      0012      EQU   PP(18)       PROGRAM PROTECT F/F
0102      0013      EQU   PRSYS(19)    DISABLE PROTECT SYSTEM F/F
0103      0014      EQU   R1TOA(20)    R1 TO A ENABLE F/F

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0104      0015      EQU  ECCCHK(21)    ECC CHECK F/F
0105      0016      EQU  R1MSB(22)    R1 MSB INHIBIT F/F
0106      0017      EQU  ALRMST(23)    ALARM STATUS F/F
0107      *
0108      *
0109      *
0110      *      JC FIELD (JUMP CONDITION) EQUATES
0111      *
0112      0001      EQU  AQROW(01)      DA AND A/G READ OR WRITE
0113      0002      EQU  A7(02)        A REG BIT 7
0114      0003      EQU  ADFLD(03)      ADDRESS FIELD F/F
0115      0004      EQU  WRTFF(04)      WRITE F/F
0116      0005      EQU  LFLAG(05)      LOOP FLAG F/F
0117      0006      EQU  TSTMD(06)      TEST MODE F/F
0118      0007      EQU  R107(07)      R1 REG BIT 7
0119      0008      EQU  PROT(08)        X-FER TO PROT MEM OK
0120      0009      EQU  BIEVEN(09)     BUS IN PARITY
0121      000A      EQU  CE(10)         CHECKEND
0122      000B      EQU  CHKECC(11)     ECC CHECK F/F
0123      000C      EQU  NEORCE(12)     NORMAL END OR CHECK END
0124      000D      EQU  XCOMP(13)      DMA TRANSFER COMPLETE
0125      000E      EQU  ALARM(14)      ALARM CONDITION
0126      000F      EQU  EMPTY(15)     BUFFER REG EMPTY
0127      0010      EQU  CUSEL(16)      CU SELECTED
0128      0011      EQU  TAGVAL(17)     TAG VALID
0129      0012      EQU  SECTOR(18)     SECTOR PULSE (INVERTED)
0130      0013      EQU  INDEX(19)      INDEX PULSE
0131      0014      EQU  QEQ8(20)       Q REG DECODE EQUALS 8
0132      0015      EQU  BLEQZ(21)      BUFFER LENGTH EQUAL ZERO
0133      0016      EQU  R1EQRM(22)     R1 REG EQUALS RAM OUTPUT
0134      0017      EQU  AUTOL(23)      AUTOLoad SWITCH
0135      0018      EQU  FIFEMP(24)     FIFO EMPTY
0136      0019      EQU  R106(25)      R1 REG BIT 6
0137      001A      EQU  FIFFUL(26)     FIFO FULL
0138      *
0139      *
0140      *
0141      *      M FIELD (SET OR CLR F/F) EQUATES
0142      *
0143      0000      EQU  CLR(0)          CLR SELECTED F/F
0144      0001      EQU  SET(1)         SET SELECTED F/F
0145      *
0146      *
0147      *
0148      *      DD FIELD (DIRECT DATA) EQUATES
0149      *
0150      0000      EQU  ZERO(0)
0151      0001      EQU  ONE(1)
0152      0002      EQU  TWO(2)
0153      0003      EQU  THRE(3)
0154      0004      EQU  FOUR(4)
0155      0005      EQU  FIVE(5)
0156      0006      EQU  SIX(6)

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0157	0007	EQU	SEVEN(7)
0158	0008	EQU	EIGHT(8)
0159	0009	EQU	NINE(9)
0160	000A	EQU	HEXA(\$A)
0161	000B	EQU	HEXB(\$B)
0162	000C	EQU	HEXC(\$C)
0163	000D	EQU	HEXD(\$D)
0164	000E	EQU	HEXE(\$E)
0165	000F	EQU	HEXF(\$F)
0166	0014	EQU	HEX14(\$14)
0167	0017	EQU	HEX17(\$17)
0168	0030	EQU	HEX30(\$30)
0169	003F	EQU	HEX3F(\$3F)
0170	0040	EQU	HEX40(\$40)
0171	005F	EQU	HEX5F(\$5F)
0172	007F	EQU	HEX7F(\$7F)
0173	0080	EQU	HEX80(\$80)
0174	00F0	EQU	HEXF0(\$F0)
0175	00FF	EQU	HEXFF(\$FF)

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0177 *****
0178 *
0179 *      MODULE DRIVE ADAPTER FIRMWARE-GB145-A/B      *
0180 *      REVISION 07 12/07/78      RELEASED      *
0181 *
0182 *****
0183 *
0184 *
0185 V      NOPP      IDLE LOOP
0185 P0000 0000
0185 P0001 0000
0186      SEQSD      MIR,FLR,HEXC
0186 P0002 0101
0186 P0003 220C
0187      SEQSD      MIR,RAH,ZERO
0187 P0004 0201
0187 P0005 3400
0188      SEQSD      ZERO,DMACLR,ZERO
0188 P0006 0301
0188 P0007 1A00
0189      SEQSD      MIR,FLR,HEXF
0189 P0008 0401
0189 P0009 220F
0190      SEQSD      MIR,RAH,SEVEN
0190 P000A 0501
0190 P000B 3407
0191 IDLE      JMPTFF  AQROW,CLR,BUSY,JA12
0191 P000C 0606
0191 P000D 200B
0192      JMPT      ALARM,JA11
0192 P000E 0738
0192 P000F 000A
0193      JMPFFF     AUTOL,CLR,ALRMST,IDLE
0193 P0010 085E
0193 P0011 2E06
0194      UJPFF      SET,BUSY,AUTO
0194 P0012 0333
0194 P0013 2131
0195 JA11      UJPFF      SET,ALRMST,IDLE
0195 P0014 0A83
0195 P0015 2E06
0196 JA12      JMPF      REQ8,JA13
0196 P0016 0B50
0196 P0017 000D
0197 TFORM     UJP      HIGH
0197 P0018 0C80
0197 P0019 01E0
0198 JA13      UJPFF      SET,BUSY,TFORM
0198 P001A 0D83
0198 P001B 200C
0199 ILL      JMPTFF     AQROW,SET,REJECT,*      A/Q REJECT
0199 P001C 0E87
0199 P001D 020E

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0200		UJP	IDLE	
0200	P001E 0F80			
0200	P001F 0006			
0201		REP	JMPTFF	AQROW,SET,REPLY,* A/Q REPLY
0201	P0020 1087			
0201	P0021 0010			
0202		UJPFF	CLR,R1TJA,IDLE	
0202	P0022 1182			
0202	P0023 2806			
0203		SEL	JMPF	CUSEL,JA91 UNIT SELECT.
0203	P0024 1240			
0203	P0025 001F			
0204		CUOP	SEQSD	AL,BOR,ZERO
0204	P0026 1301			
0204	P0027 0200			
0205		CHKCU	JMPF	CUSEL,ILL
0205	P0028 1440			
0205	P0029 000E			
0206			SEQSD	MIR,R1,1EXF0
0206	P002A 1501			
0206	P002B 20F0			
0207			SEQSD	MIR,FLR,1EXC
0207	P002C 1601			
0207	P002D 220C			
0208		JA41	JMPFFF	TAGVAL,SET,TAGOUT,JA42
0208	P002E 1747			
0208	P002F 1024			
0209			SEQFF	CLR,TAGOUT
0209	P0030 1802			
0209	P0031 1000			
0210		JA43	JMPFSD	NEORCE,ZERO,R1INC,JA44
0210	P0032 1931			
0210	P0033 1628			
0211			JMPTSD	BIEVEN,BUSIN,R1,IOER1
0211	P0034 1AA5			
0211	P0035 002B			
0212			JMPT	GE,IOER1
0212	P0036 1B43			
0212	P0037 002B			
0213		RESP1	JMPTFF	NEORCE,SET,RESP,*
0213	P0038 1033			
0213	P0039 121C			
0214			SEQFF	SET,R1TJA
0214	P003A 1D03			
0214	P003B 2800			
0215			UJPFF	CLR,RESP,REP
0215	P003C 1E82			
0215	P003D 1210			
0216		JA91	SEQFF	SET,NEED
0216	P003E 1F03			
0216	P003F 0A00			
0217			JMPTFF	AQROW,SET,REPLY,*
0217	P0040 2087			

0217 P0041 0020				
0218	JA92	JMPT	ALARM, IDLE	
0218 P0042 2198				
0218 P0043 0006				
0219		JMPF	CUSEL, JA92	
0219 P0044 2240				
0219 P0045 0021				
0220		UJP	IDLE	
0220 P0046 2380				
0220 P0047 0006				
0221	JA42	JMPTSD	CE, ZERO, R1INC, CE1	
0221 P0048 24A9				
0221 P0049 162A				
0222		JMPF	R1EQRM, JA41	
0222 P004A 2558				
0222 P004B 0017				
0223		SEQFF	CLR, TAGOUT	
0223 P004C 2602				
0223 P004D 1000				
0224	ERR1	UJPPF	SET, CUERR, REP	
0224 P004E 2753				
0224 P004F 0810				
0225	JA44	JMPF	R1EQRM, JA43	
0225 P0050 2858				
0225 P0051 0019				
0226		UJP	ERR1	
0226 P0052 2980				
0226 P0053 0027				
0227	CE1	SEQFF	CLR, TAGOUT	
0227 P0054 2A02				
0227 P0055 1000				
0228	IOER1	UJPPF	SET, CUERR, RESP1	
0228 P0056 2B83				
0228 P0057 0810				
0229	CSS	SEQSD	MIR, BOR, ZERO	CURRENT SECTOR STATUS
0229 P0058 2C01				
0229 P0059 3200				
0230		SEQSD	MIR, TBR, FOUR	
0230 P005A 2001				
0230 P005B 3004				
0231		UJP	CHKCU	
0231 P005C 2E30				
0231 P005D 0014				
0232	PATT	SEQSD	MIR, BOR, ONE	ECC PATTERN
0232 P005E 2F01				
0232 P005F 3201				
0233		UJP	SETB	
0233 P0060 3080				
0233 P0061 0034				
0234	DFS	SEQSD	MIR, BOR, ZERO	DRIVE FAULT STATUS
0234 P0062 3101				
0234 P0063 3200				
0235		UJPSD	Q, TBR, CHKCU	

0235	P0064	3281			
0235	P0065	3014			
0236			COND	SEQSD	MIR,BOR,TWO
0236	P0066	3301			ECC CONDITIONS
0236	P0067	3202			
0237			SET3	SEQSD	MIR,TBR,1EXB
0237	P0068	3401			
0237	P0069	3008			
0238			UJP		CHKCU
0238	P006A	3580			
0238	P006B	0014			
0239			PHYS	SEQSD	MIR,BOR,FOUR
0239	P006C	3501			PHYSICAL UNIT NO.
0239	P006D	3204			
0240			UJP		SET8
0240	P006E	3780			
0240	P006F	0030			
0241			CUSTA	SEQSD	MIR,BOR,TWO
0241	P0070	3A01			CU STATUS
0241	P0071	3202			
0242			UJP		SET8
0242	P0072	3930			
0242	P0073	0030			
0243			DRST1	SEQSD	MIR,BOR,ONE
0243	P0074	3A01			DRIVE STATUS ONE
0243	P0075	3201			
0244			UJP		SET8
0244	P0076	3B80			
0244	P0077	0030			
0245			DRST2	SEQSD	MIR,BOR,EIGHT
0245	P0078	3C01			DRIVE STATUS TWO
0245	P0079	3203			
0246			SET8	SEQSD	MIR,TBR,EIGHT
0246	P007A	3D01			
0246	P007B	3008			
0247			UJP		CHKCU
0247	P007C	3E30			
0247	P007D	0014			
0248			CYLST	SEQSD	MIR,FLR,FOUR
0248	P007E	3F01			CYL ADR STATUS
0248	P007F	2204			
0249				SEQSD	SRAM,R1,ZERO
0249	P0080	4001			
0249	P0081	6000			
0250				SEQSD	MIR,FLR,THRE
0250	P0082	4101			
0250	P0083	2203			
0251			UJP		REP
0251	P0084	4280			
0251	P0085	0010			
0252			SECST	SEQSD	MIR,FLR,TWO
0252	P0086	4301			SEC/HEAD STATUS
0252	P0087	2202			

0253		SEQSD	SRAM,R1,ZERO	
0253	P0088 4401			
0253	P0089 6000			
0254		SEQSD	MIR,FLR,ONE	
0254	P008A 4501			
0254	P008B 2201			
0255		UJP	REP	
0255	P008C 4680			
0255	P008D 0010			
0256		SFWAL	UJPSD	AL,CHAL,REP
0256	P008E 4781			SET FWA LOWER
0256	P008F 0A10			
0257		BUFFL	SEQSD	AL,BLL,ZERO
0257	P0090 4301			BUFFER LENGTH
0257	P0091 C600			
0258			UJPSD	ZERO,BLDEC,REP
0258	P0092 4981			
0258	P0093 1810			
0259		DECHO	JMPF	A7,ILL
0259	P0094 4A08			DRIVE ECHO OUTPUT
0259	P0095 000E			
0260			UJP	CUOP
0260	P0096 4B30			
0260	P0097 0013			
0261		SEEK	SEQSD	MIR,FLR,4EXD
0261	P0098 4C01			SEEK / LOAD CYLINDER ADDRESS
0261	P0099 2200			
0262			SEQSD	AL,RAM,ZERO
0262	P009A 4001			
0262	P009B C400			
0263			JMPT	R107,REP
0263	P009C 4E9C			
0263	P009D 0010			
0264			JMPF	CUSEL,ILL
0264	P009E 4F40			
0264	P009F 000E			
0265			SEQSD	MIR,FLR,THRE
0265	P00A0 5001			
0265	P00A1 2203			
0266			SEQSD	AL,RAM,ZERO
0266	P00A2 5101			
0266	P00A3 0400			
0267			SEQSD	AU,BOR,ZERO
0267	P00A4 5201			
0267	P00A5 F200			
0268			SEQSD	MIR,FLR,FOUR
0268	P00A6 5301			
0268	P00A7 2204			
0269			SEQSD	AU,RAM,ZERO
0269	P00A8 5401			
0269	P00A9 F400			
0270			SEQSD	MIR,TBR,SIX
0270	P00AA 5501			

0270	P00AB	3006			
0271			JMPTFF	AQROW,SET,REPLY,*	
0271	P00AC	5637			
0271	P00AD	0056			
0272			OUT	SEQSD	MIR,R1,HEXF0
0272	P00AE	5701			
0272	P00AF	20F0			
0273				SEQSD	MIR,FLR,HEXC
0273	P00B0	5801			
0273	P00B1	220C			
0274			JA111	JMPFFF	TAGVAL,SET,TAGOUT,JA112
0274	P00B2	5947			
0274	P00B3	1063			
0275				SEQFF	CLR,TAGOUT
0275	P00B4	5A02			
0275	P00B5	1000			
0276			JA113	JMPFSD	NEORCE,ZERO,R1INC,JA114
0276	P00B6	5B31			
0276	P00B7	1668			
0277				JMPT	CE,RESP2
0277	P00B8	5CA8			
0277	P00B9	006C			
0278				JMPTFF	NEORCE,SET,RESP,*
0278	P00BA	5D33			
0278	P00BB	125D			
0279				JMPTFF	LFLAG,CLR,RESP,JA121
0279	P00BC	5E36			
0279	P00BD	126B			
0280				SEQSD	MIR,T9R,FIVE
0280	P00BE	5F01			
0280	P00BF	3005			
0281				SEQSD	MIR,FLR,THRE
0281	P00C0	6001			
0281	P00C1	2203			
0282				SEQSD	SRAM,BOR,ZERO
0282	P00C2	6101			
0282	P00C3	7200			
0283				UJPFF	SET,LPFLG,OUT
0283	P00C4	6283			
0283	P00C5	1457			
0284			JA112	JMPTSD	CE,ZERO,R1INC,CE2
0284	P00C6	63A9			
0284	P00C7	166A			
0285				JMPF	R1EQRM,JA111
0285	P00C8	6458			
0285	P00C9	0059			
0286				SEQFF	CLR,TAGOUT
0286	P00CA	6502			
0286	P00CB	1000			
0287			ERR2	SEQFF	CLR,LPFLG
0287	P00CC	6602			
0287	P00CD	1400			
0288			ERR3	UJPFF	SET,CUERR,IDLE

0288	P00CE	6783			
0288	P00CF	0806			
0289			JA114	JMPF	R1EQRM,JA113
0289	P00D0	6858			
0289	P00D1	005B			
0290				UJP	ERR2
0290	P00D2	6980			
0290	P00D3	0066			
0291			CE2	UJPFF	CLR,TAGOUT,RESP2
0291	P00D4	6A82			
0291	P00D5	106C			
0292			JA121	UJPFF	CLR,LPF_3,IDLE
0292	P00D6	6B82			
0292	P00D7	1406			
0293			RESP2	JMPTFF	NEORCE,SET,RESP,*
0293	P00D8	6CB3			
0293	P00D9	126C			
0294				UJPFF	CLR,RESP,ERR2
0294	P00DA	6C82			
0294	P00DB	1266			
0295			POLL	JMPF	CUSEL,ILL
0295	P00DC	6E40			INITIATE POLL
0295	P00DD	003E			
0296				SEQSD	AL,BOR,ZERO
0296	P00DE	6F01			
0296	P00DF	0200			
0297				JMPTFF	AQROW,SET,REPLY,*
0297	P00E0	7087			
0297	P00E1	0070			
0298				SEQSD	MIR,R1,4EXF0
0298	P00E2	7101			
0298	P00E3	20F0			
0299				SEQSD	MIR,FLR,4EXC
0299	P00E4	7201			
0299	P00E5	220C			
0300			JA141	JMPFFF	TAGVAL,SET,TAGOUT,JA142
0300	P00E6	7347			
0300	P00E7	107C			
0301				SEQFF	CLR,TAGOUT
0301	P00E8	7402			
0301	P00E9	1000			
0302				SEQSD	MIR,R1,4EX5F
0302	P00EA	7501			
0302	P00EB	205F			
0303			JA143	JMPFSD	NEORCE,ZERO,R1INC,JA144
0303	P00EC	7631			
0303	P00ED	167F			
0304				SEQSD	BUSIN,R1,ZERO
0304	P00EE	7701			
0304	P00EF	0000			
0305				JMPT	BIEVEN,IOER2
0305	P00F0	78A4			
0305	P00F1	0081			

0306		JMPT	CE,IOER2	
0306	P00F2 79A8			
0306	P00F3 0081			
0307		RESP3 JMPTFF	NEORCE,SET,RESP,*	
0307	P00F4 7A33			
0307	P00F5 127A			
0308		UJPFF	CLR,RESP,IDLE	
0308	P00F6 7382			
0308	P00F7 1206			
0309		JA142 JMPTSD	CE,ZERO,R1INC,CE2	
0309	P00F8 7CA9			
0309	P00F9 166A			
0310		JMPF	R1EQRM,JA141	
0310	P00FA 7D58			
0310	P00FB 0073			
0311		UJPFF	CLR,TAGJUT,ERR3	
0311	P00FC 7E82			
0311	P00FD 1067			
0312		JA144 JMPF	R1EQRM,JA143	
0312	P00FE 7F58			
0312	P00FF 0076			
0313		UJP	ERR3	
0313	P0100 8080			
0313	P0101 0067			
0314		IOER2 UJPFF	SET,CUERR,RESP3	
0314	P0102 8183			
0314	P0103 087A			
0315		FORMAT JMPFFF	CUSEL,C.R,ADRFLD,ILL	FORMAT WRITE
0315	P0104 3242			
0315	P0105 1A0E			
0316		SEQSD	MIR,TBR,4EXE	
0316	P0106 8301			
0316	P0107 300E			
0317		SEQSD	MIR,BOR,ZERO	
0317	P0108 8401			
0317	P0109 3200			
0318		JMPTFF	AQROW,SET,REPLY,*	
0318	P010A 8587			
0318	P010B 0085			
0319		SEQSD	MIR,R1,4EXF0	
0319	P010C 8601			
0319	P010D 20F0			
0320		SEQSD	MIR,FLR,HEXC	
0320	P010E 8701			
0320	P010F 220C			
0321		JA171 JMPFFF	TAGVAL,SET,TAGOUT,JA172	
0321	P0110 8847			
0321	P0111 1097			
0322		SEQFF	CLR,TAGJUT	
0322	P0112 8902			
0322	P0113 1000			
0323		SEQSD	MIR,FLR,4EXD	
0323	P0114 8A01			

0323	P0115	2200			
0324			SEQSD	MIR, RAM, HEX14	
0324	P0116	8301			
0324	P0117	3414			
0325			OUTLP	SEQSD	MIR, R1, ZERO
0325	P0118	8C01			
0325	P0119	2J00			
0326			INLP	SEQSD	MIR, FLR, HEXC
0326	P011A	8J01			
0326	P011B	220C			
0327				SEQSD	ZERO, R1INC, ZERO
0327	P011C	8E01			
0327	P011D	1600			
0328			JMPT	NEORCE, FWEND	
0328	P011E	8FB0			
0328	P011F	009A			
0329				NOPP	
0329	P0120	9000			
0329	P0121	0000			
0330				JMPF	R1EQRM, INLP
0330	P0122	9158			
0330	P0123	003D			
0331				SEQSD	MIR, FLR, HEXD
0331	P0124	9201			
0331	P0125	2200			
0332				JMPT	R1EQRM, ERR3
0332	P0126	9308			
0332	P0127	0067			
0333				SEQSD	SRAM, R1, ZERO
0333	P0128	9401			
0333	P0129	6000			
0334				SEQSD	ZERO, R1INC, ZERO
0334	P012A	9501			
0334	P012B	1600			
0335				UJPSD	SR1, RAM, OUTLP
0335	P012C	9681			
0335	P012D	548C			
0336			JA172	JMPTSD	CE, ZERO, R1INC, CE2
0336	P012E	97A9			
0336	P012F	166A			
0337				JMPF	R1EQRM, JA171
0337	P0130	9858			
0337	P0131	0088			
0338				UJPFF	CLR, TAGOUT, ERR3
0338	P0132	9982			
0338	P0133	1067			
0339			FWEND	JMPT	CE, IOER3
0339	P0134	9AA8			
0339	P0135	009E			
0340			RESP4	JMPTFF	NEORCE, SET, RESP, *
0340	P0136	9883			
0340	P0137	1298			
0341				JMPTFF	ALARM, C-R, RESP, IDLE

0341	P0138	3CBA			
0341	P0139	1206			
0342			UJPF	SET,XFER,IDLE	
0342	P013A	5D33			
0342	P013B	0C06			
0343			IOER3	UJPF	SET,CUERR,RESP4
0343	P013C	9E83			
0343	P013D	0993			
0344			SEC	SEQSD	MIR,FLR,ONE
0344	P013E	9F01			SET SECTOR/HEAD
0344	P013F	2201			
0345				SEQSD	AL,RAM,ZERO
0345	P0140	A001			
0345	P0141	0400			
0346				SEQSD	MIR,FLR,HEXA
0346	P0142	A101			
0346	P0143	220A			
0347				SEQSD	AL,RAM,ZERO
0347	P0144	A201			
0347	P0145	0400			
0348				SEQSD	MIR,FLR,TWO
0348	P0146	A301			
0348	P0147	2202			
0349				SEQSD	AU,RAM,ZERO
0349	P0148	A401			
0349	P0149	F400			
0350				SEQSD	MIR,FLR,HEXB
0350	P014A	A501			
0350	P014B	2208			
0351				SEQSD	AU,RAM,ZERO
0351	P014C	A601			
0351	P014D	F400			
0352				UJPSD	AU,BOR,CHKCU
0352	P014E	A781			
0352	P014F	F214			
0353			RCONT	SEQSD	MIR,FLR,HEXC
0353	P0150	A801			READ RECOVERY CONTROL
0353	P0151	220C			
0354				JMPF	R1EQRM,JA201
0354	P0152	A958			
0354	P0153	0008			
0355				SEQSD	MIR,TBR,HEXC
0355	P0154	AA01			
0355	P0155	300C			
0356				SEQSD	AL,BOR,ZERO
0356	P0156	A301			
0356	P0157	0200			
0357				JMPF	A7,CHKCJ
0357	P0158	AC08			
0357	P0159	0014			
0358				JMPF	CUSEL,I-L
0358	P015A	AD40			RETURN TO ZERO SEEK
0358	P015B	000E			

0359		JMPTFF	AQROW,SET,REPLY,*	
0359	P015C AE87			
0359	P015D 00AE			
0360		SEQSD	MIR,FLR,TWO	
0360	P015E AF01			
0360	P015F 2202			
0361		SEQSD	MIR,RAM,ZERO	
0361	P0160 3001			
0361	P0161 3400			
0362		SEQSD	MIR,FLR,THRE	
0362	P0162 B101			
0362	P0163 2203			
0363		SEQSD	MIR,RAM,ZERO	
0363	P0164 B201			
0363	P0165 3400			
0364		SEQSD	MIR,FLR,FOUR	
0364	P016E 3301			
0364	P0167 2204			
0365		SEQSD	MIR,RAM,ZERO	
0365	P0168 B401			
0365	P0169 3400			
0366		SEQSD	MIR,FLR,ONE	
0366	P016A 3501			
0366	P016B 2201			
0367		SEQSD	MIR,RAM,ZERO	
0367	P016C B601			
0367	P016D 3400			
0368		UJPPF	SET,LPLG,OUT	
0368	P016E B783			
0368	P016F 1457			
0369		JA201 SEQSD	MIR,TBR,HEXD	
0369	P0170 3401			
0369	P0171 3000			
0370		UJPSD	AU,BOR,CHKCU	
0370	P0172 B381			
0370	P0173 F214			
0371		REED SEQFF	SET,LPLG	READ
0371	P0174 B403			
0371	P0175 1400			
0372		WRITE JMPTFF	BLEQZ,C-LR,ADRFLD,BRCHK	WRITE
0372	P0176 B806			
0372	P0177 1AGE			
0373		JA231 JMPT	TSTMD,JA232	
0373	P0178 B098			
0373	P0179 00C3			
0374		JMPF	CUSEL,ILL	
0374	P017A B040			
0374	P017B 000E			
0375		SEQSD	MIR,FLR,NINE	
0375	P017C BE01			
0375	P017D 2209			
0376		SEQSD	AU,RAM,ZERO	
0376	P017E BF01			

0376	P017F	F400			
0377			SEQSD		MIR,R1,ZERO
0377	P0180	C001			
0377	P0181	2000			
0378			JMPT		R1EQRM,JA233
0378	P0182	C108			
0378	P0183	0003			
0379			JA234	SEQSD	AL,R1,ZERO
0379	P0184	C201			
0379	P0185	C000			
0380			JA232	JMPF	LFLAG,JA310
0380	P0186	C314			
0380	P0187	00C6			
0381				JMPF	PROT,JA310
0381	P0188	C420			
0381	P0189	00C6			
0382				SEQFF	SET,PP
0382	P018A	C503			
0382	P018B	2400			
0383			JA310	JMPF	A7,JA311
0383	P018C	C608			
0383	P018D	00C3			
0384				SEQFF	SET,AORFLD
0384	P018E	C703			
0384	P018F	1A00			
0385			JA311	JMPTFF	AQROW,SET,REPLY,*
0385	P0190	C387			
0385	P0191	00C8			
0386				JMPT	TSTMD,JA312
0386	P0192	C333			
0386	P0193	00D1			
0387				JMPT	LFLAG,JA321
0387	P0194	CA94			
0387	P0195	00D5			
0388				SEQFF	SET,WRT
0388	P0196	C303			
0388	P0197	1400			
0389			JA322	JMPFFF	ADFLO,CLR,L PFLG,ADFIND
0389	P0198	CC0E			
0389	P0199	14D7			
0390				UJP	AOR
0390	P019A	CD80			
0390	P019B	0169			
0391			BRCHK	JMPF	EMPTY,JA231
0391	P019C	CE3C			
0391	P019D	00BC			
0392				JMPT	LFLAG,JA231
0392	P019E	CF94			
0392	P019F	004C			
0393				UJPFF	SET,TM,JA232
0393	P01A0	0033			
0393	P01A1	16C3			
0394			JA312	JMPF	LFLAG,TM

0394	P01A2	0114			
0394	P01A3	010F			
0395			UJPFF	CLR,LPFLG,TMR	
0395	P01A4	0282			
0395	P01A5	151E			
0396			JA233	SEQSD	MIR, RAM, FIVE
0396	P01A6	0301			
0396	P01A7	3405			
0397			UJP	JA234	
0397	P01A8	0480			
0397	P01A9	00C2			
0398			JA321	JMPFFF	R106, SET, READ, JA322
0398	P01AA	0567			
0398	P01AB	10CC			
0399			UJPFF	SET, ECC2-HK, JA322	
0399	P01AC	0683			
0399	P01AD	2ACC			
0400			ADFIND	SEQSD	MIR, FLR, HEXF
0400	P01AE	0701			
0400	P01AF	220F			
0401				SEQSD	MIR, RAM, HEX80
0401	P01B0	0401			
0401	P01B1	3480			
0402			ADCOM	SEQFF	SET, ADRFLD
0402	P01B2	0903			
0402	P01B3	1A00			
0403				SEQSD	MIR, FLR, HEXE
0403	P01B4	0A01			
0403	P01B5	220E			
0404				SEQSD	MIR, RAM, HEX7F
0404	P01B6	0301			
0404	P01B7	347F			
0405			REPT	SEQSD	MIR, TBR, NINE
0405	P01B8	0C01			
0405	P01B9	3009			
0406				SEQSD	MIR, FLR, EIGHT
0406	P01BA	0D01			
0406	P01BB	2208			
0407				SEQSD	MIR, BOR, NINE
0407	P01BC	0E01			
0407	P01BD	3209			
0408				JMPT	SECTOR, *
0408	P01BE	0FC8			
0408	P01BF	000F			
0409			JA251	JMPFFF	TAGVAL, SET, TAGOUT, JA252
0409	P01C0	E047			
0409	P01C1	1106			
0410				JMPFFF	NEORCE, CLR, TAGOUT, *
0410	P01C2	E132			
0410	P01C3	10E1			
0411				JMPTFF	CE, SET, RESP, IOER6
0411	P01C4	E2A3			
0411	P01C5	1368			

0412		SEQSD	MIR,FLR,THRE
0412	P01C6 E301		
0412	P01C7 2203		
0413		SEQSD	SRAM,R1,ZERO
0413	P01C8 E401		
0413	P01C9 6000		
0414		SEQSD	MIR,FLR,HEXD
0414	P01CA E501		
0414	P01CB 2200		
0415		JMPT	NEORCE,*
0415	P01CC E680		
0415	P01CD 00E6		
0416		JMPTFF	ALARM,C-R,RESP,ERRX
0416	P01CE E78A		
0416	P01CF 1388		
0417		JMPF	R1EQRM,NOCOM
0417	P0100 E858		
0417	P0101 0100		
0418		SEQSD	MIR,FLR,TWO
0418	P0102 E901		
0418	P0103 2202		
0419		SEQSD	SRAM,R1,ZERO
0419	P0104 EA01		
0419	P0105 6000		
0420		SEQSD	MIR,FLR,HEXB
0420	P0106 E301		
0420	P0107 2203		
0421		JMPF	R1EQRM,NOCOM
0421	P0108 EC58		
0421	P0109 0100		
0422		SEQFF	SET,R1MSB
0422	P010A E003		
0422	P010B 2C00		
0423		SEQSD	MIR,FLR,ONE
0423	P010C EE01		
0423	P010D 2201		
0424		SEQSD	SRAM,R1,ZERO
0424	P010E EF01		
0424	P010F 6000		
0425		SEQSD	MIR,FLR,HEXA
0425	P01E0 F001		
0425	P01E1 220A		
0426		JMPF	R1EQRM,NOCOM
0426	P01E2 F158		
0426	P01E3 0100		
0427		SEQSD	MIR,FLR,HEXF
0427	P01E4 F201		
0427	P01E5 220F		
0428		SEQSD	SRAM,R1,ZERO
0428	P01E6 F301		
0428	P01E7 6000		
0429		JMPTFF	R107,CLR,R1MSB,JA271
0429	P01E8 F49E		

0429	P01E9	2CFC			
0430			SEQSD	SR1,FLRJ,ZERO	
0430	P01EA	F501			
0430	P01EB	4400			
0431			SEQSD	MIR,FLR,ZERO	
0431	P01EC	F601			
0431	P01ED	2200			
0432			SEQSD	SRAM,R1,ZERO	
0432	P01EE	F701			
0432	P01EF	6000			
0433			SEQSD	SR1,FLR,ZERO	
0433	P01F0	F801			
0433	P01F1	4200			
0434			SEQSD	SFLR,B0R,HEX40	
0434	P01F2	F901			
0434	P01F3	9240			
0435			JMPFFF	WRTFF,C-R,ADRFLD,RRET	
0435	P01F4	FA12			
0435	P01F5	1827			
0436			UJP	WRET	
0436	P01F6	F380			
0436	P01F7	0129			
0437			JA271 UJPFF	SET,CUERR,ERRX	
0437	P01F8	FC83			
0437	P01F9	0388			
0438			NOPP		
0438	P01FA	F000			
0438	P01FB	0000			
0439			NOPP		
0439	P01FC	FE00			
0439	P01FD	0000			
0440			NOPP		
0440	P01FE	FF00			
0440	P01FF	0000			
0441			NOCOM SEQFF	CLR,R1MSB	
0441	P0200	0002			
0441	P0201	2C00			
0442			SEQSD	MIR,FLR,HEXE	
0442	P0202	0101			
0442	P0203	220E			
0443			SEQSD	SRAM,R1,ZERO	
0443	P0204	0201			
0443	P0205	6000			
0444			SEQSD	MIR,FLR,HEXC	
0444	P0206	0301			
0444	P0207	220C			
0445			JMPT	R1EQRM,ERRB	
0445	P0208	0408			
0445	P0209	0103			
0446			SEQSD	ZERO,R1INC,ZERO	
0446	P020A	0501			
0446	P020B	1600			
0447			SEQSD	MIR,FLR,HEXE	

0447	P020C	0601			
0447	P020D	220E			
0448			UJPSD	SR1, RAM, REPT	
0448	P020E	0781			
0448	P020F	540C			
0449			ERR8	SEQFF	SET, CUERR
0449	P0210	0303			
0449	P0211	0800			
0450			ERR7	SEQFF	CLR, WRT
0450	P0212	0902			
0450	P0213	1800			
0451				SEQFF	CLR, READ
0451	P0214	0A02			
0451	P0215	1C00			
0452				SEQFF	CLR, ECCCHK
0452	P0216	0302			
0452	P0217	2A00			
0453				SEQFF	CLR, PP
0453	P0218	0C02			
0453	P0219	2400			
0454				SEQSD	ZERO, DMA CLR, ZERO
0454	P021A	0001			
0454	P021B	1A00			
0455				UJPFF	CLR, TM, IDLE
0455	P021C	0E82			
0455	P021D	1606			
0456			TMW	SEQSD	MIR, BLU, ZERO
0456	P021E	0F01			TEST MODE WRITE
0456	P021F	2800			
0457				SEQSD	MIR, BLL, HEX3F
0457	P0220	1031			
0457	P0221	263F			
0458				SEQFF	SET, WRT
0458	P0222	1103			
0458	P0223	1800			
0459				SEQSD	MIR, R1, ZERO
0459	P0224	1201			
0459	P0225	2900			
0460				SEQSD	MIR, FLR, 1EXC
0460	P0226	1301			
0460	P0227	220C			
0461			JA301	JMPTSD	XCOMP, ZERO, R1INC, ALDON
0461	P0228	1485			
0461	P0229	171B			
0462				NOPP	
0462	P022A	1500			
0462	P022B	0000			
0463				JMPF	R1EQRM, JA301
0463	P022C	1558			
0463	P022D	0114			
0464				UJP	ERR8
0464	P022E	1780			
0464	P022F	0103			

0465		TCOMP	SEQFF	CLR,TM	
0465	P0230 1802				
0465	P0231 1600				
0466			SEQFF	CLR,READ	
0466	P0232 1902				
0466	P0233 1C00				
0467			SEQFF	CLR,ECCCHK	
0467	P0234 1A02				
0467	P0235 2A00				
0468		ALDON	SEQFF	CLR,WRT	
0468	P0236 1302				
0468	P0237 1800				
0469			SEQFF	CLR,PP	
0469	P0238 1C02				
0469	P0239 2400				
0470			UJPPF	SET,XFER,IDLE	
0470	P023A 1383				
0470	P0233 0C06				
0471		TMR	SEQSD	MIR,BLU,ZERO	TEST MODE READ
0471	P023C 1E01				
0471	P023D 2300				
0472			SEQSD	MIR,BLL,HEX3F	
0472	P023E 1F01				
0472	P023F 263F				
0473			SEQFF	SET,READ	
0473	P0240 2003				
0473	P0241 1C00				
0474			SEQSD	MIR,R1,ZERO	
0474	P0242 2101				
0474	P0243 2000				
0475			SEQSD	MIR,FLR,4EXC	
0475	P0244 2201				
0475	P0245 220C				
0476		JA331	JMPTSD	XCOMP,ZERO,R1INC,TCOMP	
0476	P0246 2385				
0476	P0247 1718				
0477			NOPP		
0477	P0248 2400				
0477	P0249 0000				
0478			JMPF	R1EQRM,JA331	
0478	P024A 2558				
0478	P024B 0123				
0479			UJP	ERR8	
0479	P024C 2630				
0479	P024D 0108				
0480		RRET	SEQSD	MIR,TBR,NINE	READ DATA/ ECC CHECK
0480	P024E 2701				
0480	P024F 3009				
0481			UJP	ROWCOM	
0481	P0250 2880				
0481	P0251 012A				
0482		WRET	SEQSD	MIR,TBR,HEXA	WRITE DATA
0482	P0252 2301				

0482	P0253	300A			
0483			ROWCOM	JMPFFF	TAGVAL,SET,TAGOUT,JA341
0483	P0254	2A47			
0483	P0255	113A			
0484				JMPTFF	CHKECC,CLR,TAGOUT,JA343
0484	P0256	28AE			
0484	P0257	113D			
0485				SEQFF	SET,DMAGO
0485	P0258	2C03			
0485	P0259	2200			
0486			JA342	JMPF	NEORCE,*
0486	P025A	2030			
0486	P025B	012D			
0487				JMPTFF	CE,CLR,IM,IOERS
0487	P025C	2EAA			
0487	P025D	173C			
0488			RESP6	JMPTFF	NEORCE,SET,RESP,*
0488	P025E	2FB3			
0488	P025F	132F			
0489				SEQFF	CLR,RESP
0489	P0260	3002			
0489	P0261	1200			
0490				JMPTFF	ALARM,CLR,DMAGO,ERRX
0490	P0262	313A			
0490	P0263	2388			
0491				JMPT	WRTFF,JA351
0491	P0264	3290			
0491	P0265	013E			
0492				JMPT	BLEQZ,DONE
0492	P0266	3304			
0492	P0267	013F			
0493			GOON	SEQSD	MIR,FLR,ONE
0493	P0268	3401			
0493	P0269	2201			
0494				SEQSD	SRAM,R1,ZERO
0494	P026A	3501			
0494	P026B	5000			
0495				JMPT	R107,CHKD
0495	P026C	363C			
0495	P026D	0141			
0496				SEQSD	ZERO,R1INC,ZERO
0496	P026E	3701			
0496	P026F	1600			
0497				SEQSD	MIR,FLR,HEXA
0497	P0270	3801			
0497	P0271	220A			
0498				UJPSD	S R1, RAM, ADCOM
0498	P0272	3981			
0498	P0273	5409			
0499			JA341	JMPF	CE,ROWCOM
0499	P0274	3A28			
0499	P0275	012A			
0500			IOERR	SEQFF	CLR,TAGOUT

0500	P0276	3802			
0500	P0277	1000			
0501			IOER5	UJPF	SET,CUERR,RESP6
0501	P0278	3C83			
0501	P0279	092F			
0502			JA343	UJPF	SET,TM,JA342
0502	P027A	3093			
0502	P027B	1720			
0503			JA351	JMPF	EMPTY,GOOD
0503	P027C	3E3C			
0503	P027D	0134			
0504			DONE	JMPF	XCOMP,*
0504	P027E	3F34			
0504	P027F	013F			
0505				UJPF	CLR,PRTSYS,TCOMP
0505	P0280	4032			
0505	P0281	2718			
0506			CHKHD	SEQSD	MIR,FLR,TWO
0506	P0282	4101			
0506	P0283	2232			
0507				SEQSD	SRAM,R1,ZERO
0507	P0284	4201			
0507	P0285	6000			
0508				SEQSD	ZERO,R1INC,ZERO
0508	P0286	4301			
0508	P0287	1600			
0509				SEQSD	MIR,FLR,NINE
0509	P0288	4401			
0509	P0289	2239			
0510				JMPT	R1EQRM,JA371
0510	P028A	4508			
0510	P0283	0158			
0511				SEQSD	SR1,BOR,ZERO
0511	P028C	4601			
0511	P028D	5200			
0512				SEQSD	MIR,FLR,HEXB
0512	P028E	4701			
0512	P028F	2208			
0513				SEQSD	SR1,RAM,ZERO
0513	P0290	4801			
0513	P0291	5400			
0514				SEQSD	MIR,FLR,TWO
0514	P0292	4901			
0514	P0293	2202			
0515				SEQSD	SR1,RAM,ZERO
0515	P0294	4A01			
0515	P0295	5400			
0516				SEQSD	MIR,TBR,SEVEN
0516	P0296	4B01			
0516	P0297	3007			
0517				SEQSD	MIR,R1,HEXF0
0517	P0298	4C01			
0517	P0299	20F0			

0518		SEQSD	MIR,FLR,HEXC
0518	P029A 4001		
0518	P029B 220C		
0519		JA381 JMPFFF	TAGVAL,SET,TAGOUT,JA382
0519	P029C 4E47		
0519	P029D 1162		
0520		SEQFF	CLR,TAGOUT
0520	P029E 4F02		
0520	P029F 1000		
0521		JA383 JMPFSD	NEORCE,ZERO,R1INC,JA384
0521	P02A0 5031		
0521	P02A1 1765		
0522		JMPT	CE,IOERS
0522	P02A2 51A8		
0522	P02A3 0168		
0523		RESP7 JMPTFF	NEORCE,SET,RESP, *
0523	P02A4 52B3		
0523	P02A5 1352		
0524		JMPTFF	ALARM,CLR,RESP,ERR7
0524	P02A6 533A		
0524	P02A7 1309		
0525		JMPT	ADFLD,ADR
0525	P02A8 548C		
0525	P02A9 0169		
0526		SEQSD	MIR,FLR,HEXA
0526	P02AA 5501		
0526	P02AB 220A		
0527		SEQSD	MIR,RAM,ZERO
0527	P02AC 5601		
0527	P02AD 3400		
0528		UJP	ADFINO
0528	P02AE 5780		
0528	P02AF 00D7		
0529		JA371 JMPT	WRTFF,JA372
0529	P02B0 5890		
0529	P02B1 015C		
0530		JMPF	FIFEMP, *
0530	P02B2 5960		
0530	P02B3 0159		
0531		JMPFFF	EMPTY,C_LR,ECCCHK, *
0531	P02B4 5A3E		
0531	P02B5 285A		
0532		UJP	JA373
0532	P02B6 5830		
0532	P02B7 015E		
0533		JA372 JMPT	FIFFUL,JA373
0533	P02B8 5C28		
0533	P02B9 015E		
0534		JMPF	BLEQZ,JA372
0534	P02BA 5D54		
0534	P02B3 015C		
0535		JA373 SEQFF	CLR,PP
0535	P02BC 5E02		

0535	P02B0	2400			
0536			SEQFF	CLR, READ	
0536	P02B2	5F02			
0536	P02BF	1C00			
0537			SEQFF	CLR, WRT	
0537	P02C0	6002			
0537	P02C1	1300			
0538			UJPFF	SET, EDC, IDLE	
0538	P02C2	6183			
0538	P02C3	0E06			
0539			JA332	JMPTSD	CE, ZERO, R1INC, CE3
0539	P02C4	62A9			
0539	P02C5	1767			
0540			JMPF	R1EQRM, JA381	
0540	P02C6	6358			
0540	P02C7	014E			
0541			UJPFF	CLR, TAGJUT, ERR8	
0541	P02C8	6482			
0541	P02C9	1103			
0542			JA384	JMPF	R1EQRM, JA383
0542	P02CA	6558			
0542	P02CB	0150			
0543			UJP	ERR8	
0543	P02CC	6680			
0543	P02CD	0108			
0544			CE3	SEQFF	CLR, TAGJUT
0544	P02CE	6702			
0544	P02CF	1000			
0545			IOER6	UJPFF	SET, CUERR, RESP7
0545	P02D0	6883			
0545	P02D1	0952			
0546			ADR	SEQSD	MIR, FLR, ONE
0546	P02D2	6901			READ OR WRITE ADR FIELD
0546	P02D3	2201			
0547				SEQSD	MIR, RAM, ZERO
0547	P02D4	6A01			
0547	P02D5	3400			
0548			JMPF	INDEX, *	
0548	P02D6	6B4C			
0548	P02D7	016B			
0549			ADREP	SEQSD	MIR, BOR, NINE
0549	P02D8	6C01			
0549	P02D9	3209			
0550				SEQSD	MIR, FLRJ, ZERO
0550	P02DA	6D01			
0550	P02DB	2400			
0551				SEQSD	MIR, FLR, NINE
0551	P02DC	6E01			
0551	P02DD	2209			
0552			JMPF	WRTFF, JA401	
0552	P02DE	6F10			
0552	P02DF	0131			
0553				SEQSD	MIR, TBR, HEXA

0553	P02E0	7001		
0553	P02E1	300A		
0554			COMAD	JMPFFF TAGVAL,SET,TAGOUT,JA411
0554	P02E2	7147		
0554	P02E3	1183		
0555				JMPTFF CHKECC,CLR,TAGOUT,JA413
0555	P02E4	72AE		
0555	P02E5	1185		
0556				SEQFF SET,DMA30
0556	P02E6	7303		
0556	P02E7	2200		
0557			JA412	JMPF NEORCE,*
0557	P02E8	7430		
0557	P02E9	0174		
0558				JMPTFF CE,CLR,TM,IOERS
0558	P02EA	75AA		
0558	P02EB	173C		
0559				JMPTFF NEORCE,SET,RESP,*
0559	P02EC	7603		
0559	P02ED	1376		
0560				SEQFF CLR,RESP
0560	P02EE	7702		
0560	P02EF	1200		
0561				JMPTFF ALARM,CLR,DMA30,ERRX
0561	P02F0	783A		
0561	P02F1	2388		
0562				JMPT WRTFF,JA421
0562	P02F2	7930		
0562	P02F3	0186		
0563				JMPT BLEQZ,DONE
0563	P02F4	7AD4		
0563	P02F5	013F		
0564			MORE	JMPT SECTOR,*
0564	P02F6	73C8		
0564	P02F7	017B		
0565				JMPT INDEX,CHKHD
0565	P02F8	7CCC		
0565	P02F9	0141		
0566				SEQSD MIR,FLR,ONE
0566	P02FA	7D01		
0566	P02FB	2201		
0567				SEQSD SRAM,R1,ZERO
0567	P02FC	7E01		
0567	P02FD	6000		
0568				SEQSD ZERO,R1INC,ZERO
0568	P02FE	7F01		
0568	P02FF	1600		
0569				UJPSD SR1,RAM,ADREP
0569	P0300	8081		
0569	P0301	556C		
0570			JA401	SEQSD MIR,TBR,NINE
0570	P0302	3101		
0570	P0303	3009		

0571		UJP	COMAD	
0571	P0304 8280			
0571	P0305 0171			
0572		JA411 JMPF	CE,COMAD	
0572	P0306 8328			
0572	P0307 0171			
0573		UJP	IOERR	
0573	P0308 8480			
0573	P0309 0138			
0574		JA413 UJPFF	SET,TM,JA412	
0574	P030A 8583			
0574	P030B 1774			
0575		JA421 JMPF	EMPTY,MORE	
0575	P030C 863C			
0575	P030D 0178			
0576		UJP	DONE	
0576	P030E 8780			
0576	P030F 013F			
0577		ERRX JMPT	WRTFF,JA351	
0577	P0310 8880			
0577	P0311 0180			
0578		JMPF	FIFEMP,*	
0578	P0312 8960			
0578	P0313 0189			
0579		JMPF	EMPTY,*	
0579	P0314 8A3C			
0579	P0315 018A			
0580		JMPF	XCOMP,ERR7	
0580	P0316 8B34			
0580	P0317 0109			
0581		COMPL UJPFF	SET,XFER,ERR7	
0581	P0318 8C83			
0581	P0319 0009			
0582		JA361 JMPT	XCOMP,COMPL	
0582	P031A 8D94			
0582	P031B 018C			
0583		JA362 JMPT	BLEQZ,ERR7	
0583	P031C 8ED4			
0583	P031D 0109			
0584		JMPT	FIFFUL,ERR7	
0584	P031E 8FE8			
0584	P031F 0109			
0585		UJP	JA362	
0585	P0320 9080			
0585	P0321 018E			
0586		AUTO SEQFF	SET,RESP ***** AUTOLOAD *****	
0586	P0322 9103			
0586	P0323 1200			
0587		SEQFF	SET,PRTSYS	
0587	P0324 9203			
0587	P0325 2600			
0588		SEQFF	CLR,RESP	
0588	P0326 9302			

0588	P0327	1200			
0589			AUTSEL	JMPFFF	CUSEL,SET,NEED,*
0589	P0328	9443			
0589	P0329	0394			
0590				JMPTSD	AUTOL,ZERO,DMACLR,*
0590	P032A	9500			
0590	P032B	1895			
0591				SEQSD	MIR,BOR,HEX7F
0591	P032C	9501			
0591	P032D	327F			
0592				UJFFF	SET,LPFL3,FLTCL
0592	P032E	9783			
0592	P032F	15A3			
0593			ORSEL	SEQFF	CLR,LPFL3
0593	P0330	9802			
0593	P0331	1400			
0594				SEQFF	SET,ALEN3
0594	P0332	9903			
0594	P0333	1E00			
0595				SEQSD	ZERO,BOR,ZERO
0595	P0334	9A01			
0595	P0335	1200			
0596				SEQFF	CLR,ALEN3
0596	P0336	9B02			
0596	P0337	1E00			
0597				SEQSD	MIR,TBR,THRE
0597	P0338	9C01			
0597	P0339	3003			
0598			JA451	JMPFFF	TAGVAL,SET,TAGOUT,JA452
0598	P033A	9D47			
0598	P033B	11C7			
0599				JMPFFF	NEORCE,CLR,TAGOUT,*
0599	P033C	9E32			
0599	P033D	119E			
0600				JMPT	CE,RESP2
0600	P033E	9FA8			
0600	P033F	006C			
0601				JMPTFF	NEORCE,SET,RESP,*
0601	P0340	A083			
0601	P0341	13A0			
0602				SEQFF	CLR,RESP
0602	P0342	A102			
0602	P0343	1200			
0603				SEQSD	MIR,BOR,HEXFF
0603	P0344	A201			
0603	P0345	32FF			
0604			FLTCL	SEQSD	MIR,TBR,HEXC
0604	P0346	A301			
0604	P0347	300C			
0605			JA461	JMPFFF	TAGVAL,SET,TAGOUT,JA462
0605	P0348	A447			
0605	P0349	11C9			
0606				JMPFFF	NEORCE,CLR,TAGOUT,*

0606	P034A	A532			
0606	P034B	11A5			
0607			JMPT	CE,RESP2	
0607	P034C	A6A8			
0607	P034D	006C			
0608			JMPTFF	NEORCE,SET,RESP,*	
0608	P034E	A7B3			
0608	P034F	13A7			
0609			JMPTFF	LFLAG,CLR,RESP,ORSEL	
0609	P0350	A896			
0609	P0351	1398			
0610			AGAIN	SEQSD	MIR,TBR,EIGHT
0610	P0352	A901			
0610	P0353	3008			
0611				SEQSD	MIR,BOR,EIGHT
0611	P0354	AA01			
0611	P0355	3208			
0612			JA471	JMPFFF	TAGVAL,SET,TAGOUT,JA472
0612	P0356	A347			
0612	P0357	11C8			
0613				JMPFFF	NEORCE,CLR,TAGOUT,*
0613	P0358	AC32			
0613	P0359	11AC			
0614				JMPTSD	BIEVEN,BJSIN,R1,RESP2
0614	P035A	ADA5			
0614	P035B	006C			
0615				JMPT	CE,RESP2
0615	P035C	A6A8			
0615	P035D	006C			
0616				JMPTFF	NEORCE,SET,RESP,*
0616	P035E	AFB3			
0616	P035F	13AF			
0617				SEQSD	MIR,FLR,NINE
0617	P0360	3001			
0617	P0361	2209			
0618				SEQSD	MIR,RAM,HEX 30
0618	P0362	B101			
0618	P0363	3430			
0619				JMPFFF	R1EQRM,CLR,RESP,AGAIN
0619	P0364	B25A			
0619	P0365	13A9			
0620				SEQSD	MIR,TBR,SEVEN
0620	P0366	3301			
0620	P0367	3007			
0621				SEQSD	MIR,BOR,ZERO
0621	P0368	3401			
0621	P0369	3200			
0622			JA491	JMPFFF	TAGVAL,SET,TAGOUT,JA492
0622	P036A	B547			
0622	P036B	11C0			
0623				JMPFFF	NEORCE,CLR,TAGOUT,*
0623	P036C	B632			
0623	P036D	1196			

0624		JMPT	CE,RESP2
0624	P036E 27A8		
0624	P036F 006C		
0625		JHPTFF	NEORDE,SET,RESP, *
0625	P0370 9833		
0625	P0371 1338		
0626		SEQFF	CLR,RESP
0626	P0372 8902		
0626	P0373 1200		
0627		SEQSD	MIR,FLR,HEXD
0627	P0374 8A01		
0627	P0375 2203		
0628		SEQSD	MIR,RAM,ZERO
0628	P0376 B301		
0628	P0377 3400		
0629		SEQSD	MIR,FLR,HEXA
0629	P0378 BC01		
0629	P0379 220A		
0630		SEQSD	MIR,RAM,ZERO
0630	P037A B001		
0630	P037B 3400		
0631		SEQSD	MIR,FLR,HEXB
0631	P037C BE01		
0631	P037D 220B		
0632		SEQSD	MIR,RAM,ZERO
0632	P037E BF01		
0632	P037F 3400		
0633		SEQSD	MIR,CHAUU,ZERO
0633	P0380 C001		
0633	P0381 2E00		
0634		SEQSD	MIR,CHAJ,ZERO
0634	P0382 C101		
0634	P0383 2C00		
0635		SEQSD	MIR,CHAL,ZERO
0635	P0384 C201		
0635	P0385 2400		
0636		SEQSD	MIR,BLU,HEX17
0636	P0386 C301		
0636	P0387 2917		
0637		SEQSD	MIR,BLL,HEXFF
0637	P0388 C401		
0637	P0389 26FF		
0638		SEQFF	SET,PP
0638	P038A C503		
0638	P038B 2400		
0639		UJPFF	SET,READ,ADFIND
0639	P038C C603		
0639	P038D 1CD7		
0640		JA452 JMPT	CE,CE2
0640	P038E C7A8		
0640	P038F 006A		
0641		UJP	JA451
0641	P0390 C880		

0641	P0391	019D			
0642			JA462	JMPT	CE,CE2
0642	P0392	C9A8			
0642	P0393	006A			
0643				UJP	JA461
0643	P0394	CA80			
0643	P0395	01A4			
0644			JA472	JMPT	CE,CE2
0644	P0396	C3A8			
0644	P0397	006A			
0645				UJP	JA471
0645	P0398	CC80			
0645	P0399	01AB			
0646			JA492	JMPT	CE,CE2
0646	P039A	CDA8			
0646	P039B	006A			
0647				UJP	JA491
0647	P039C	CE30			
0647	P039D	01B5			
0648			SFWAU	JMPT	A7,LDRAM
0648	P039E	CF88			SET FIRST WORD ADDRESS UPPER/
0648	P039F	01D2			
0649				JMPT	R106,SETRAM
0649	P03A0	00E4			LOAD FILE ADDRESS/WRITE FILE
0649	P03A1	01D4			
0650				UJPSD	AL,CWAUJ,REP
0650	P03A2	D181			
0650	P03A3	CE10			
0651			LDRAM	SEQSD	AL,FLR
0651	P03A4	0201			
0651	P03A5	C200			
0652				UJPSD	AU,RAM,REP
0652	P03A6	D381			
0652	P03A7	F410			
0653			SETRAM	UJPSD	AL,FLR,REP
0653	P03A8	0481			
0653	P03A9	C210			
0654			SPEC	UJPPF	SET,R1TDA,REP
0654	P03AA	D583			READ FILE
0654	P03AB	2810			
0655			JA252	JMPF	CE,JA251
0655	P03AC	0628			
0655	P03AD	00E0			
0656				UJP	CE3
0656	P03AE	0780			
0656	P03AF	0167			
0657			WAIT	JMPT	AQROW,*
0657	P03B0	D884			DIRECTOR FUNCTION / STATUS
0657	P03B1	01D8			
0658				UJP	IDLE
0658	P03B2	D380			
0658	P03B3	0006			
0659				NOPP	

0659 P03B4 DA00
 0659 P03B5 0000
 0660
 0660 P03B6 0300
 0660 P03B7 0000
 0661
 0661 P03B8 0C00
 0661 P03B9 0000
 0662
 0662 P03BA DD00
 0662 P03BB 0000
 0663
 0663 P03BC DE00
 0663 P03BD 0000
 0664
 0664 P03BE DF00
 0664 P03BF 0000
 0665
 0666
 0667
 0668
 0669
 0670
 0671
 0671 P03C0 E081
 0671 P03C1 61D5
 0672
 0672 P03C2 E180
 0672 P03C3 0036
 0673
 0673 P03C4 E283
 0673 P03C5 2810
 0674
 0674 P03C6 E383
 0674 P03C7 2810
 0675
 0675 P03C8 E+83
 0675 P03C9 2810
 0676
 0676 P03CA E540
 0676 P03CB 003F
 0677
 0677 P03CC E680
 0677 P03CD 002C
 0678
 0678 P03CE E780
 0678 P03CF 0043
 0679
 0679 P03D0 E380
 0679 P03D1 01D8
 0680
 0680 P03D2 E980
 0680 P03D3 003C

NOPP

NOPP

NOPP

NOPP

NOPP

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TRANSFORM JUMP TABLE

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HIGH	UJPSD	SRAM,R1,SPEC	READ FILE
	UJP	PHYS	PHYSICAL UNIT NUMBER
	UJPFF	SET,R1TDA,REP	POLL STATUS
	UJPFF	SET,R1TDA,REP	SEL ACK STATUS
	UJPFF	SET,R1TDA,REP	DRIVE ECHO INPUT
	UJP	CYLST	CYL ADDR STATUS
	UJP	CSS	CURRENT SECTOR STATUS
	UJP	SECS	SECTOR AND HEAD STATUS
	UJP	WAIT	DA STATUS
	UJP	DRST2	DRIVE STATUS 2

0681		UJP	PATT	ECC PATTERN
0681	P0304 EA80			
0681	P0305 002F			
0682		UJP	COND	ECC CONDITIONS
0682	P0306 E880			
0682	P0307 0033			
0683		UJP	DFS	DRIVE FAULT STATUS
0683	P0308 EC80			
0683	P0309 0031			
0684		UJP	CUSTA	CU STATUS
0684	P030A E080			
0684	P030B 0038			
0685		UJP	DRST1	DRIVE STATUS 1
0685	P030C EE80			
0685	P030D 093A			
0686		UJPPF	SET,RITCA,REP	CU ECHO INPUT
0686	P030E EF83			
0686	P030F 2310			
0687		UJPSD	AU,BLU,BUFFL	SET BUFFER LENGTH
0687	P03E0 F081			
0687	P03E1 E848			
0688		UJPSD	Q,TBR,CJOP	DRIVE REQUEST
0688	P03E2 F181			
0688	P03E3 B013			
0689		UJPSD	Q,TBR,POLL	INITIATE POLL
0689	P03E4 F281			
0689	P03E5 306E			
0690		UJPSD	Q,TBR,SEL	UNIT SELECT
0690	P03E6 F381			
0690	P03E7 B012			
0691		UJPSD	Q,TBR,DECHO	DRIVE ECHO OUTPUT
0691	P03E8 F481			
0691	P03E9 B04A			
0692		UJPSD	AU,R1,SEEK	LOAD CYL ADDRESS
0692	P03EA F581			
0692	P03EB E04C			
0693		UJPPF	CLR,XFER,FORMAT	FORMAT WRITE
0693	P03EC F682			
0693	P03ED 0C82			
0694		UJPSD	Q,TBR,SEC	LOAD SEC AND HEAD ADDR
0694	P03EE F781			
0694	P03EF B09F			
0695		UJP	WAIT	DIRECTOR FUNCTION
0695	P03F0 F880			
0695	P03F1 0108			
0696		UJPPF	CLR,XFER,REED	READ FROM DISK
0696	P03F2 F982			
0696	P03F3 0C8A			
0697		UJPPF	CLR,XFER,WRITE	WRITE TO DISK
0697	P03F4 FA82			
0697	P03F5 0C3B			
0698		UJPSD	Q,TBR,CJOP	ECC CONTROL
0698	P03F6 F381			

0698 P03F7 B013		
0699	UJPSD	AJ,R1,RCONT READ RECOV/STATUS CNTL
0699 P03F8 FC81		
0699 P03F9 E0A8		
0700	UJPSD	AU,CHAU,SFWAL SET FWA LOWER
0700 P03FA FD31		
0700 P03FB EC47		
0701	UJPSD	AL,R1,SFWAJ SET FWA UPPER
0701 P03FC FE31		
0701 P03FD C1CF		
0702	UJPSD	Q,TBR,CJOP CU ECHO OUTPUT
0702 P03FE FF31		
0702 P03FF B013		
0703		*
0704		*
0705		*
0706		*
0707	END	

PGM= 0400 (1024) COM = 0000 (0) DAT = 0000 (0)

EQUIVALENCES

DEF.LINE	NAME	VALUE	REFERENCED AT LINE NUMBER
0000	I	00FF (000255)	
0053	BUSIN	0000 (000000)	0211, 0304, 0614
0054	MIR	0001 (000001)	0186, 0187, 0189, 0190, 0206, 0207, 0229, 0230, 0232, 0234, 0236, 0237, 0239, 0241, 0243, 0245, 0246, 0248, 0250, 0252, 0254, 0261, 0265, 0268, 0270, 0272, 0273, 0280, 0281, 0298, 0299, 0302, 0316, 0317, 0319, 0320, 0323, 0324, 0325, 0326, 0331, 0344, 0346, 0348, 0350, 0353, 0355, 0360, 0361, 0362, 0363, 0364, 0365, 0366, 0367, 0369, 0375, 0377, 0396, 0400, 0401, 0403, 0404, 0405, 0406, 0407, 0412, 0414, 0418, 0420, 0423, 0425, 0427, 0431, 0442, 0444, 0447, 0456, 0457, 0459, 0460, 0471, 0472, 0474, 0475, 0480, 0482, 0493, 0497, 0506, 0509, 0512, 0514, 0516, 0517, 0518, 0526, 0527, 0546, 0547, 0549, 0550, 0551, 0553, 0566, 0570, 0591, 0597, 0603, 0604, 0610, 0611, 0617, 0618, 0620, 0621, 0627, 0628, 0629, 0630, 0631, 0632, 0633, 0634, 0635, 0636, 0637
0055	SR1	0002 (000002)	0335, 0430, 0433, 0448, 0498, 0511, 0513, 0515, 0569
0056	SRAM	0003 (000003)	0249, 0253, 0282, 0333, 0413, 0419, 0424, 0428, 0432, 0443, 0494, 0507, 0567, 0671
0057	SFLR	0004 (000004)	0434
0058	Q	0005 (000005)	0235, 0588, 0589, 0690, 0691, 0694, 0698, 0702
0059	AL	0006 (000006)	0204, 0256, 0257, 0262, 0266, 0296, 0345, 0347, 0356, 0379, 0650, 0651, 0653, 0701
0060	AU	0007 (000007)	0267, 0269, 0349, 0351, 0352, 0370, 0376, 0652, 0687, 0692, 0699, 0700
0066	RI	0000 (000000)	0206, 0211, 0249, 0253, 0272, 0298, 0302, 0304, 0319, 0325, 0333, 0377, 0379, 0413, 0419, 0424, 0428, 0432, 0443, 0459, 0474, 0494, 0507, 0517, 0567, 0614, 0671, 0692, 0699, 0701
0067	FLR	0001 (000001)	0186, 0189, 0207, 0248, 0250, 0252, 0254, 0261, 0265, 0268, 0273, 0281, 0299, 0320, 0323, 0326, 0331, 0344, 0346, 0348, 0350, 0353, 0360, 0362, 0364, 0366, 0375, 0400, 0403, 0406, 0412, 0414, 0418, 0420, 0423, 0425, 0427, 0431, 0433, 0442, 0444, 0447, 0460, 0475, 0493, 0497, 0506, 0509, 0512, 0514, 0518, 0526, 0546, 0551, 0566, 0617, 0627, 0629, 0631, 0651, 0653
0068	FLRU	0002 (000002)	0430, 0550
0069	BLL	0003 (000003)	0257, 0457, 0472, 0637
0070	BLU	0004 (000004)	0456, 0471, 0636, 0687
0071	CMAL	0005 (000005)	0256, 0635
0072	CM4U	0006 (000006)	0634, 0700
0073	CM4UU	0007 (000007)	0633, 0650
0074	TBR	0008 (000008)	0230, 0235, 0237, 0246, 0270, 0280, 0316, 0355, 0369, 0405, 0480, 0482, 0516, 0553, 0570, 0597, 0604, 0610, 0620, 0688, 0689, 0690, 0691, 0694, 0698, 0702
0075	BOR	0009 (000009)	0204, 0229, 0232, 0234, 0236, 0239, 0241, 0243, 0245, 0267, 0282, 0296, 0317, 0352, 0356, 0370, 0407, 0434, 0511, 0549, 0591, 0595, 0603, 0611, 0621
0076	RAM	000A (000010)	0187, 0190, 0262, 0266, 0269, 0324, 0335, 0345, 0347, 0349, 0351, 0361, 0363, 0365, 0367, 0376, 0396, 0401, 0404, 0443, 0498, 0513, 0515, 0527, 0547, 0569, 0618, 0628, 0630, 0632, 0652
0077	RIINC	000B (000011)	0210, 0221, 0276, 0284, 0303, 0309, 0327, 0334, 0336, 0446, 0461, 0476, 0496, 0508, 0521, 0539, 0568
0078	3LJEC	000C (000012)	0258
0079	DMACLR	000D (000013)	0188, 0434, 0590

0085	REPLY	0000	(000000)	0201, 0217, 0271, 0297, 0318, 0359, 0385
0086	REJECT	0001	(000001)	0199
0087	CUERR	0004	(000004)	0224, 0228, 0288, 0314, 0343, 0437, 0449, 0501, 0545
0088	NEED	0005	(000005)	0216, 0589
0089	XFER	0006	(000006)	0342, 0470, 0581, 0693, 0696, 0697
0090	EOC	0007	(000007)	0538
0091	TAGOUT	0008	(000008)	0208, 0209, 0223, 0227, 0274, 0275, 0286, 0291, 0300, 0301, 0311, 0321, 0322, 0338, 0409, 0410 0483, 0484, 0500, 0519, 0520, 0541, 0544, 0554, 0555, 0598, 0599, 0605, 0606, 0612, 0613, 0622 0623
0092	RESP	0009	(000009)	0213, 0215, 0278, 0279, 0293, 0294, 0307, 0308, 0340, 0341, 0411, 0416, 0488, 0489, 0523, 0524 0559, 0560, 0586, 0588, 0601, 0602, 0608, 0609, 0616, 0619, 0625, 0626
0093	LFFLG	000A	(000010)	0283, 0287, 0292, 0368, 0371, 0389, 0395, 0592, 0593
0094	TM	000B	(000011)	0393, 0455, 0465, 0487, 0502, 0558, 0574
0095	WRT	000C	(000012)	0388, 0450, 0458, 0468, 0537
0096	ADRFLO	0000	(000013)	0315, 0372, 0384, 0402, 0435
0097	READ	000E	(000014)	0398, 0451, 0466, 0473, 0536, 0639
0098	ALENB	000F	(000015)	0594, 0596
0099	BUSY	0010	(000016)	0191, 0194, 0198
0100	DMAGO	0011	(000017)	0485, 0490, 0556, 0561
0101	PP	0012	(000018)	0382, 0453, 0469, 0535, 0638
0102	PRTSYS	0013	(000019)	0505, 0587
0103	RITOA	0014	(000020)	0202, 0214, 0654, 0673, 0674, 0675, 0686
0104	ECCCHK	0015	(000021)	0399, 0452, 0467, 0531
0105	RIMSB	0016	(000022)	0422, 0429, 0441
0106	ALRMST	0017	(000023)	0193, 0195
0112	AQROW	0001	(000001)	0191, 0199, 0201, 0217, 0271, 0297, 0318, 0359, 0385, 0657
0113	A7	0002	(000002)	0259, 0357, 0383, 0643
0114	ADFLD	0003	(000003)	0389, 0525
0115	WRTFF	0004	(000004)	0435, 0491, 0529, 0552, 0562, 0577
0116	LFLAG	0005	(000005)	0279, 0380, 0387, 0392, 0394, 0609
0117	TSTHD	0006	(000006)	0373, 0386
0118	R107	0007	(000007)	0263, 0429, 0435
0119	PROT	0008	(000008)	0381
0120	BIEVEN	0009	(000009)	0211, 0305, 0614
0121	CE	000A	(000010)	0212, 0221, 0277, 0284, 0306, 0309, 0336, 0339, 0411, 0487, 0499, 0522, 0539, 0558, 0572, 0600 0607, 0615, 0624, 0640, 0642, 0644, 0646, 0655
0122	CHKEGC	000B	(000011)	0484, 0555
0123	NEORCE	000C	(000012)	0210, 0213, 0276, 0278, 0293, 0303, 0307, 0328, 0340, 0410, 0415, 0486, 0488, 0521, 0523, 0557 0559, 0599, 0601, 0606, 0608, 0613, 0616, 0623, 0625
0124	XCOMP	000D	(000013)	0461, 0476, 0504, 0580, 0582
0125	ALARM	000E	(000014)	0192, 0218, 0341, 0416, 0490, 0524, 0561
0126	EMPTY	000F	(000015)	0391, 0503, 0531, 0575, 0579
0127	COSEL	0010	(000016)	0203, 0205, 0219, 0264, 0295, 0315, 0358, 0374, 0589
0128	TAGVAL	0011	(000017)	0208, 0274, 0300, 0321, 0409, 0483, 0519, 0554, 0598, 0605, 0612, 0622
0129	SECTOR	0012	(000018)	0408, 0564
0130	INDEX	0013	(000019)	0548, 0565
0131	REQ8	0014	(000020)	0196
0132	BLEQZ	0015	(000021)	0372, 0492, 0534, 0563, 0583
0133	R1EQRM	0016	(000022)	0222, 0225, 0285, 0289, 0310, 0312, 0330, 0332, 0337, 0354, 0378, 0417, 0421, 0426, 0445, 0463 0478, 0510, 0540, 0542, 0619
0134	AUTOL	0017	(000023)	0193, 0590
0135	FIFEMP	0018	(000024)	0530, 0578
0136	R106	0019	(000025)	0398, 0649

0137	FIFFUL	001A	(000026)	0533, 0584
0143	CLR	0000	(000000)	0191, 0193, 0202, 0209, 0215, 0223, 0227, 0275, 0279, 0286, 0287, 0291, 0292, 0294, 0301, 0308 0311, 0315, 0322, 0338, 0341, 0372, 0389, 0395, 0410, 0416, 0429, 0435, 0441, 0450, 0451, 0452 0453, 0455, 0465, 0466, 0467, 0468, 0469, 0484, 0487, 0489, 0490, 0500, 0505, 0520, 0524, 0531 0535, 0536, 0537, 0541, 0544, 0555, 0558, 0560, 0561, 0588, 0593, 0596, 0599, 0602, 0606, 0609 0613, 0619, 0623, 0626, 0693, 0696, 0697
0144	SET	0001	(000001)	0194, 0195, 0198, 0199, 0201, 0208, 0213, 0214, 0216, 0217, 0224, 0228, 0271, 0274, 0278, 0283 0288, 0293, 0297, 0300, 0307, 0314, 0318, 0321, 0340, 0342, 0343, 0359, 0368, 0371, 0382, 0384 0385, 0388, 0393, 0398, 0399, 0402, 0409, 0411, 0422, 0437, 0449, 0458, 0470, 0473, 0483, 0485 0488, 0501, 0502, 0519, 0523, 0538, 0545, 0554, 0556, 0559, 0574, 0581, 0586, 0587, 0589, 0592 0594, 0598, 0601, 0605, 0608, 0612, 0616, 0622, 0625, 0638, 0639, 0654, 0673, 0674, 0675, 0686 0150 ZERO 0000 (000000) 0187, 0188, 0188, 0204, 0210, 0221, 0229, 0234, 0249, 0253, 0257, 0258, 0262, 0266, 0267, 0269 0276, 0282, 0284, 0296, 0303, 0304, 0309, 0317, 0325, 0327, 0327, 0333, 0334, 0334, 0336, 0345 0347, 0349, 0351, 0356, 0361, 0363, 0365, 0367, 0376, 0377, 0379, 0413, 0419, 0424, 0428, 0430 0431, 0432, 0433, 0443, 0446, 0446, 0454, 0454, 0456, 0459, 0461, 0471, 0474, 0476, 0494, 0496 0496, 0507, 0508, 0508, 0511, 0513, 0515, 0521, 0527, 0539, 0547, 0550, 0567, 0568, 0568, 0590 0595, 0595, 0621, 0628, 0630, 0632, 0633, 0634, 0635
0151	ONE	0001	(000001)	0232, 0243, 0254, 0344, 0366, 0423, 0493, 0546, 0566
0152	TWO	0002	(000002)	0236, 0241, 0252, 0348, 0360, 0418, 0506, 0514
0153	THRE	0003	(000003)	0250, 0265, 0281, 0362, 0412, 0597
0154	FOUR	0004	(000004)	0230, 0239, 0248, 0268, 0364
0155	FIVE	0005	(000005)	0280, 0396
0156	SIX	0006	(000006)	0270
0157	SEVEN	0007	(000007)	0190, 0516, 0620
0158	EIGHT	0008	(000008)	0245, 0246, 0406, 0610, 0611
0159	NINE	0009	(000009)	0375, 0405, 0407, 0480, 0509, 0549, 0551, 0570, 0617
0160	HEXA	000A	(000010)	0346, 0425, 0482, 0497, 0526, 0553, 0629
0161	HEXB	000B	(000011)	0237, 0350, 0420, 0512, 0631
0162	HEXC	000C	(000012)	0186, 0207, 0273, 0299, 0320, 0326, 0353, 0355, 0444, 0460, 0475, 0518, 0604
0163	HEXD	000D	(000013)	0261, 0323, 0331, 0369, 0414, 0627
0164	HEXE	000E	(000014)	0316, 0403, 0442, 0447
0165	HEXF	000F	(000015)	0189, 0400, 0427
0166	HEX14	0014	(000020)	0324
0167	HEX17	0017	(000023)	0636
0168	HEX30	0030	(000048)	0618
0169	HEX3F	003F	(000063)	0457, 0472
0170	HEX40	0040	(000064)	0434
0171	HEX5F	005F	(000095)	0302
0172	HEX7F	007F	(000127)	0404, 0591
0173	HEX80	0080	(000128)	0401
0174	HEXF0	00F0	(000240)	0206, 0272, 0298, 0319, 0517
0175	HEXFF	00FF	(000255)	0603, 0637

SYMBOLS

DEF.LINE	NAME	ADDRESS	REFERENCED AT LINE NUMBER
0185	V	0000	0185, 0186, 0187, 0188, 0189, 0190, 0191, 0191, 0192, 0192, 0193, 0193, 0194, 0194, 0195, 0195 0196, 0196, 0197, 0197, 0198, 0198, 0199, 0199, 0200, 0200, 0201, 0201, 0202, 0202, 0203, 0203 0204, 0205, 0205, 0206, 0207, 0208, 0208, 0209, 0210, 0210, 0211, 0211, 0212, 0212, 0213, 0213 0214, 0215, 0215, 0216, 0217, 0217, 0218, 0218, 0219, 0219, 0220, 0220, 0221, 0221, 0222, 0222 0223, 0224, 0224, 0225, 0225, 0226, 0226, 0227, 0228, 0228, 0229, 0230, 0231, 0231, 0232, 0233 0233, 0234, 0235, 0235, 0236, 0237, 0238, 0238, 0239, 0240, 0240, 0241, 0242, 0242, 0243, 0244 0244, 0245, 0246, 0247, 0247, 0248, 0249, 0250, 0251, 0251, 0252, 0253, 0254, 0255, 0255, 0256 0256, 0257, 0258, 0259, 0259, 0260, 0260, 0261, 0262, 0263, 0263, 0264, 0264, 0265, 0265, 0266 0267, 0268, 0269, 0270, 0271, 0271, 0272, 0273, 0274, 0274, 0275, 0276, 0276, 0277, 0277, 0278 0278, 0279, 0279, 0280, 0281, 0282, 0283, 0283, 0284, 0284, 0285, 0285, 0286, 0287, 0288, 0288 0289, 0289, 0290, 0290, 0291, 0291, 0292, 0292, 0293, 0293, 0294, 0294, 0295, 0295, 0296, 0297 0297, 0298, 0299, 0300, 0300, 0301, 0302, 0303, 0303, 0304, 0305, 0305, 0306, 0306, 0307, 0307 0308, 0308, 0309, 0309, 0310, 0310, 0311, 0311, 0312, 0312, 0313, 0313, 0314, 0314, 0315, 0315 0316, 0317, 0318, 0318, 0319, 0320, 0321, 0321, 0322, 0323, 0324, 0325, 0326, 0327, 0328, 0328 0329, 0330, 0330, 0331, 0332, 0332, 0333, 0334, 0335, 0335, 0336, 0336, 0337, 0337, 0338, 0338 0339, 0339, 0340, 0340, 0341, 0341, 0342, 0342, 0343, 0343, 0344, 0345, 0346, 0347, 0348, 0349 0350, 0351, 0352, 0352, 0353, 0354, 0354, 0355, 0356, 0357, 0357, 0358, 0358, 0359, 0359, 0360 0361, 0362, 0363, 0364, 0365, 0366, 0367, 0368, 0368, 0369, 0370, 0370, 0371, 0372, 0372, 0373 0373, 0374, 0374, 0375, 0376, 0377, 0378, 0378, 0379, 0380, 0380, 0381, 0381, 0382, 0383, 0383 0384, 0385, 0385, 0386, 0386, 0387, 0387, 0388, 0389, 0389, 0390, 0390, 0391, 0391, 0392, 0392 0393, 0393, 0394, 0394, 0395, 0395, 0396, 0397, 0397, 0398, 0398, 0399, 0399, 0400, 0401, 0402 0403, 0404, 0405, 0406, 0407, 0408, 0408, 0409, 0409, 0410, 0410, 0411, 0411, 0412, 0413, 0414 0415, 0415, 0416, 0416, 0417, 0417, 0418, 0419, 0420, 0421, 0421, 0422, 0423, 0424, 0425, 0426 0426, 0427, 0428, 0429, 0429, 0430, 0431, 0432, 0433, 0434, 0435, 0435, 0436, 0436, 0437, 0437 0438, 0439, 0440, 0441, 0442, 0443, 0444, 0445, 0445, 0446, 0447, 0448, 0448, 0449, 0450, 0451 0452, 0453, 0454, 0455, 0455, 0456, 0457, 0458, 0459, 0460, 0461, 0461, 0462, 0463, 0463, 0464 0464, 0465, 0466, 0467, 0468, 0469, 0470, 0470, 0471, 0472, 0473, 0474, 0475, 0476, 0476, 0477 0478, 0478, 0479, 0479, 0480, 0481, 0481, 0482, 0483, 0483, 0484, 0484, 0485, 0486, 0486, 0487 0487, 0488, 0488, 0489, 0490, 0490, 0491, 0491, 0492, 0492, 0493, 0494, 0495, 0495, 0496, 0497 0498, 0498, 0499, 0499, 0500, 0501, 0501, 0502, 0502, 0503, 0503, 0504, 0504, 0505, 0505, 0506 0507, 0508, 0509, 0510, 0510, 0511, 0512, 0513, 0514, 0515, 0516, 0517, 0518, 0519, 0519, 0520 0521, 0521, 0522, 0522, 0523, 0523, 0524, 0524, 0525, 0525, 0526, 0527, 0528, 0528, 0529, 0529 0530, 0530, 0531, 0531, 0532, 0532, 0533, 0533, 0534, 0534, 0535, 0536, 0537, 0538, 0538, 0539 0539, 0540, 0540, 0541, 0541, 0542, 0542, 0543, 0543, 0544, 0545, 0545, 0546, 0547, 0548, 0548 0549, 0550, 0551, 0552, 0552, 0553, 0554, 0554, 0555, 0555, 0556, 0557, 0557, 0558, 0558, 0559 0559, 0560, 0561, 0561, 0562, 0562, 0563, 0563, 0564, 0564, 0565, 0565, 0566, 0567, 0568, 0569 0569, 0570, 0571, 0571, 0572, 0572, 0573, 0573, 0574, 0574, 0575, 0575, 0576, 0576, 0577, 0577 0578, 0578, 0579, 0579, 0580, 0580, 0581, 0581, 0582, 0582, 0583, 0583, 0584, 0584, 0585, 0585 0586, 0587, 0588, 0589, 0589, 0590, 0590, 0591, 0592, 0592, 0593, 0594, 0595, 0596, 0597, 0598 0598, 0599, 0599, 0600, 0600, 0601, 0601, 0602, 0603, 0604, 0605, 0605, 0606, 0606, 0607, 0607 0608, 0608, 0609, 0609, 0610, 0611, 0612, 0612, 0613, 0613, 0614, 0614, 0615, 0615, 0616, 0616

0191	IDLE	000C	0617, 0618, 0619, 0619, 0620, 0621, 0622, 0622, 0623, 0623, 0624, 0624, 0625, 0625, 0626, 0627
0195	JA11	0014	0628, 0629, 0630, 0631, 0632, 0633, 0634, 0635, 0636, 0637, 0638, 0639, 0639, 0640, 0640, 0641
0196	JA12	0016	0641, 0642, 0642, 0643, 0643, 0644, 0644, 0645, 0645, 0646, 0646, 0647, 0647, 0648, 0648, 0649
0197	YFORM	0018	0649, 0650, 0650, 0651, 0652, 0652, 0653, 0653, 0654, 0654, 0655, 0655, 0656, 0656, 0657, 0657
0198	JA13	001A	0658, 0658, 0659, 0660, 0661, 0662, 0663, 0664, 0671, 0671, 0672, 0672, 0673, 0673, 0674, 0674
0199	ILL	001C	0675, 0675, 0676, 0676, 0677, 0677, 0678, 0678, 0679, 0679, 0680, 0680, 0681, 0681, 0682, 0682
0201	REP	0020	0683, 0683, 0684, 0684, 0685, 0685, 0686, 0686, 0687, 0687, 0688, 0688, 0689, 0689, 0690, 0690
0203	SEL	0024	0691, 0691, 0692, 0692, 0693, 0693, 0694, 0694, 0695, 0695, 0696, 0696, 0697, 0697, 0698, 0698
0204	GUOP	0026	0699, 0699, 0700, 0700, 0701, 0701, 0702, 0702, 0703, 0703, 0704, 0704, 0705, 0705, 0706, 0706
0205	CHKCU	0028	0193, 0195, 0200, 0202, 0218, 0220, 0288, 0292, 0308, 0341, 0342, 0455, 0470, 0538, 0658
0208	JA41	002E	0192
0210	JA43	0032	0191
0213	RESP1	0039	0198
0216	JA91	003E	0196
0218	JA92	0042	0205, 0259, 0264, 0295, 0315, 0358, 0374
0221	JA42	0048	0215, 0224, 0251, 0255, 0256, 0258, 0263, 0650, 0652, 0653, 0654, 0673, 0674, 0675, 0686
0224	ERR1	004E	0690
0225	JA44	0050	0260, 0688, 0698, 0702
0227	CE1	0054	0231, 0235, 0238, 0247, 0352, 0357, 0370
0228	IOER1	0056	0222
0229	CSS	0058	0225
0232	PATT	005E	0228
0234	OFS	0062	0203
0236	COND	0066	0219
0237	SETB	0068	0208
0239	PHYS	006C	0226
0241	CUSTA	0070	0210
0243	DRST1	0074	0221
0245	DRST2	0078	0211, 0212
0246	SET8	007A	0677
0248	CYLST	007E	0681
0252	SEGST	0086	0683
0256	SFWAL	008E	0682
0257	BUFFL	0090	0233
0259	DECHO	0094	0672
0261	SEEK	0098	0684
0272	OUT	00AE	0685
0274	JA111	00B2	0680
0276	JA113	00B6	0240, 0242, 0244
0284	JA112	00C6	0676
0287	ERR2	00CC	0678
0288	ERR3	00CE	0700
0289	JA114	00D0	0687
0291	GRP	00D4	0691
			0692
			0283, 0368
			0285
			0283
			0274
			0290, 0294
			0311, 0313, 0332, 0338
			0276
			0284, 0309, 0336, 0640, 0642, 0644, 0646

0292	JA121	0006	0279	
0293	RESP2	0008	0277, 0291, 0600, 0607, 0614, 0615, 0624	
0295	POLL	000C	0689	
0300	JA141	00E6	0310	
0303	JA143	00EC	0312	
0307	RESP3	00F4	0314	
0309	JA142	00F8	0300	
0312	JA144	00FE	0303	
0314	IOER2	0102	0305, 0306	
0315	FORMAT	0104	0693	
0321	JA171	0110	0337	
0325	OUTLP	0118	0335	
0326	INLP	011A	0330	
0336	JA172	012E	0321	
0339	FWEND	0134	0328	
0340	RESP4	0136	0343	
0343	IOER3	013C	0339	
0344	SEC	013E	0694	
0353	RCONT	0150	0699	
0369	JA201	0170	0354	
0371	REED	0174	0696	
0372	WRITE	0176	0697	
0373	JA231	0178	0391, 0392	
0379	JA234	0184	0397	
0380	JA232	0186	0373, 0393	
0383	JA310	018C	0380, 0381	
0385	JA311	0190	0383	
0389	JA322	0198	0398, 0399	
0391	BRCHK	019C	0372	
0394	JA312	01A2	0386	
0396	JA233	01A6	0378	
0398	JA321	01AA	0387	
0400	ADFINO	01AE	0389, 0528, 0639	
0402	ADCOM	01B2	0498	
0405	REPT	01B8	0448	
0409	JA251	01C0	0655	
0437	JA271	01F8	0429	
0441	NDCOM	0200	0417, 0421, 0426	
0449	ERR3	0210	0445, 0454, 0479, 0541, 0543	
0450	ERR7	0212	0524, 0550, 0581, 0583, 0584	
0456	TMW	021E	0394	
0461	JA301	0228	0463	
0465	TCOMP	0230	0476, 0505	
0468	ALDON	0236	0461	
0471	TMR	023C	0395	
0476	JA331	0246	0478	
0480	RRET	024E	0435	
0482	WRET	0252	0436	
0483	ROWCOM	0254	0481, 0499	
0486	JA342	025A	0502	
0488	RESP6	025E	0501	
0493	GOON	0268	0503	
0499	JA341	0274	0483	

0500	IOERR	0276	0573
0501	IOERS	0278	0487, 0558
0502	JA343	027A	0484
0503	JA351	027C	0491
0504	DONE	027E	0492, 0563, 0576
0506	CHKHD	0282	0495, 0565
0519	JA381	029C	0540
0521	JA383	02A0	0542
0523	RESP7	02A4	0545
0529	JA371	02B0	0510
0533	JA372	02B8	0529, 0534
0535	JA373	02BC	0532, 0533
0539	JA382	02C4	0519
0542	JA384	02CA	0521
0544	CE3	02CE	0539, 0656
0545	IOER6	02D0	0411, 0522
0546	ADR	02D2	0390, 0525
0549	ADREP	02D8	0569
0554	COMAD	02E2	0571, 0572
0557	JA412	02E8	0574
0564	MORE	02F6	0575
0570	JA401	0302	0552
0572	JA411	0306	0554
0574	JA413	030A	0555
0575	JA421	030C	0562
0577	ERRX	0310	0416, 0437, 0490, 0561
0581	COMFL	0318	0582
0582	JA361	031A	0577
0583	JA362	031C	0585
0586	AUTO	0322	0194
0589	AUTSEL	0328	
0593	DRSEL	0330	0609
0598	JA451	033A	0641
0604	FLTCL	0346	0592
0605	JA461	0348	0643
0610	AGAIN	0352	0619
0612	JA471	0356	0645
0622	JA491	036A	0647
0640	JA452	038E	0598
0642	JA462	0392	0605
0644	JA472	0396	0612
0646	JA492	039A	0622
0648	SFWAU	039E	0701
0651	LDRAM	03A4	0648
0653	SETRAM	03A8	0649
0654	SPEC	03AA	0671
0655	JA252	03AC	0409
0657	WAIT	03B0	0679, 0695
0671	HIGH	03C0	0197

*** ALPHABETICAL SORT OF SYMBOLS ***

A7	0113	ADCOM	0402	ADFLD	0400	ADFLD	0114	ADR	0546	ADREP	0549	ADRFLD	0096	AGAIN	0610	AL	0059
ALARM	0125	ALDON	0468	ALEND	0098	ALR MST	0106	AQROW	0112	AU	0060	AUTO	0586	AUTOL	0134	AUTSEL	0589
BIEVEN	0120	BLDEC	0078	BLEQZ	0132	BLL	0069	BLU	0070	BOR	0075	BRCHK	0391	BUFFL	0257	BUSIN	0053
BUSY	0099	CE	0121	CE1	0227	CE2	0291	CE3	0544	CHKCU	0205	CHKECC	0122	CHKHD	0506	CLR	0143
COMAD	0554	COMPL	0581	CONO	0236	CSS	0229	CUERR	0087	CUOP	0204	CUSEL	0127	CUSTA	0241	CWAL	0071
CWAU	0072	CWAUU	0073	CYLST	0248	DECHO	0259	DFS	0234	DMACLR	0079	DMAGO	0100	DONE	0504	DRSEL	0593
ORST1	0243	ORST2	0245	ECCCHK	0104	EIGHT	0158	EMPTY	0126	EOC	0090	ERR1	0224	ERR2	0287	ERR3	0288
ERR7	0450	ERR8	0449	ERRX	0577	FIFEMP	0135	FIFFUL	0137	FIVE	0155	FLR	0067	FLRU	0068	FLTCL	0604
FORMAT	0315	FOUR	0154	FWENO	0339	GOON	0493	HEX14	0166	HEX17	0167	HEX30	0168	HEX3F	0169	HEX40	0170
HEX5F	0171	HEX7F	0172	HEX80	0173	HEXA	0160	HEXB	0161	HEXC	0162	HEXD	0163	HEXE	0164	HEXF	0165
HEXF0	0174	HEXFF	0175	HIGH	0671	I	0000	IDLE	0191	ILL	0199	INDEX	0130	INLP	0326	IOER1	0228
IOER2	0314	IOER3	0343	IOER5	0501	IOER6	0545	IOERR	0500	JA11	0195	JA111	0274	JA112	0284	JA113	0276
JA114	0289	JA12	0196	JA121	0292	JA13	0198	JA141	0300	JA142	0309	JA143	0303	JA144	0312	JA171	0321
JA172	0336	JA201	0369	JA231	0373	JA232	0380	JA233	0396	JA234	0379	JA251	0409	JA252	0655	JA271	0437
JA301	0461	JA310	0383	JA311	0385	JA312	0394	JA321	0398	JA322	0389	JA331	0476	JA341	0499	JA342	0486
JA343	0502	JA351	0503	JA361	0582	JA362	0583	JA371	0529	JA372	0533	JA373	0535	JA381	0519	JA382	0539
JA383	0521	JA384	0542	JA401	0570	JA41	0208	JA411	0572	JA412	0557	JA413	0574	JA42	0221	JA421	0575
JA43	0210	JA44	0225	JA451	0598	JA452	0640	JA461	0605	JA462	0642	JA471	0612	JA472	0644	JA491	0622
JA492	0646	JA91	0216	JA92	0218	LDRAM	0651	LFLAG	0116	LPFLG	0093	MIR	0054	MORE	0564	NEED	0088
NEORCE	0123	NINE	0159	NOCOM	0441	ONE	0151	OUT	0272	OUTLP	0325	PATT	0232	PHYS	0239	POLL	0295
PP	0101	PROT	0119	PRTSYS	0102	Q	0058	REQ8	0131	R1	0066	R106	0136	R107	0118	R1EQRM	0133
R1INC	0077	R1MSB	0105	R1TOA	0103	RAM	0076	RCONT	0353	READ	0097	REED	0371	REJECT	0086	REP	0201
REPLY	0085	REPT	0405	RESP	0092	RESP1	0213	RESP2	0293	RESP3	0307	RESP4	0340	RESP6	0488	RESP7	0523
ROMCOM	0483	RRET	0480	SEC	0344	SEOST	0252	SECTOR	0129	SEEK	0261	SEL	0203	SET	0144	SET8	0246
SETB	0237	SETRAM	0653	SEVEN	0157	SFLR	0057	SFWAL	0256	SFWAU	0648	SIX	0156	SPEC	0654	SRI	0055
SRAM	0056	TAGOUT	0091	TAGVAL	0128	TBR	0074	TCOMP	0465	TFORM	0197	THRE	0153	TH	0094	THR	0471
THM	0456	TSTND	0117	TWO	0152	V	0185	WAIT	0657	WRET	0482	WRITE	0372	WRT	0095	WRTFF	0115
XCOMP	0124	XFER	0089	ZERO	0150												

MODULE DRIVE ADAPTER FPLA EQUATION LISTING

D

JOB: FPLA, RELBIN FPLA REL BIN DECK PM 96750778 REV A
1700 MASS STORAGE OPERATING SYSTEM VERSION 5.0 DATE OF RUN: 11/08/78 SYSTEM ID: HOUSE 3,5,6,7 CYBER 18-20 (11/11/11)

FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFF	PPP PPP	LLL	AAA AAA
FFF	PPP PPP	LLL	AAA AAA
FFF	PPP PPP	LLL	AAA AAA
FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFFFFFFFFFFF	PPPPPPPPPP	LLL	AAAAAAAAAAAA
FFF	PPP	LLL	AAA AAA
FFF	PPP	LLL	AAA AAA
FFF	PPP	LLL	AAA AAA
FFF	PPP	LLLLLLLLLLLL	AAA AAA
FFF	PPP	LLLLLLLLLLLL	AAA AAA
FFF	PPP	LLLLLLLLLLLL	AAA AAA

*CTD, TYPE *E AFTER E

*K,L12

L

FPLA 349D

X,N

Q8QINI	4249	DECK-ID H04	FTN 3.3	RUNTIME	SUMMARY-117
Q8QEND	431F	DECK-ID H05	FTN 3.3	RUNTIME	SUMMARY-102
Q8CMP	4340	DECK-ID H06	FTN 3.3	RUNTIME	SUMMARY-116
Q8RMBU	441E	DECK-ID H07	FTN 3.3	RUNTIME	SUMMARY-102
Q8ERRM	4537	DECK-ID H08	FTN 3.3	RUNTIME	SUMMARY-102
Q8DFID	460E	DECK-ID H09	FTN 3.3	RUNTIME	SUMMARY-116
Q8QX	46D1	DECK-ID H10	FTN 3.3	RUNTIME	SUMMARY-116
Q8QUNI	4736	DECK-ID H11	FTN 3.3	RUNTIME	SUMMARY-102
Q8FGET	478F	DECK-ID H12	FTN 3.3	RUNTIME	SUMMARY-116
Q8HAGT	4821	DECK-ID H13	FTN 3.3	RUNTIME	SUMMARY-117
TAPCON	4877	DECK-ID H14	FTN 3.3	RUNTIME	SUMMARY-117
PSSTOP	4914	DECK-ID H16	FTN 3.3	RUNTIME	SUMMARY-102
Q8PAND	494B	DECK-ID H17	FTN 3.3	RUNTIME	SUMMARY-106
PARA6N	49AD	DECK-ID G12	FTN 3.3	RUNTIME	SUMMARY-111
Q8IFRM	498F	DECK-ID H01	FTN 3.3	RUNTIME	SUMMARY-106
Q8FS	49FE	DECK-ID H02	FTN 3.3	RUNTIME	SUMMARY-106
Q8TRAN	4C33	DECK-ID H03	FTN 3.3	RUNTIME	SUMMARY-115
Q8EXP1	5474	DECK-ID H18	FTN 3.3	RUNTIME	SUMMARY-102
Q8EXP9	54EF	DECK-ID H19	FTN 3.3	RUNTIME	SUMMARY-102
FLOTN	55AB	DECK-ID G14	FTN 3.3	RUNTIME	SUMMARY-112
CGMNF	57E9	DECK-ID G15	FTN 3.3	RUNTIME	SUMMARY-114
Q8DXP1	591D	DECK-ID K15	FTN 3.3	RUNTIME	SUMMARY-102
Q8DXP9	598A	DECK-ID K16	FTN 3.3	RUNTIME	SUMMARY-102
DFLOTN	5AC5	DECK-ID K12	FTN 3.3	RUNTIME	SUMMARY-102
Q8PRMS	5F3A	DECK-ID G01	FTN 3.3	RUNTIME	SUMMARY-116

E10

AYERTO

AMGNTG

ADAYTG

FPLA SOURCE DECK
 TITLE IC-FPLA,MODULE DR ADAPTER,AQ
 PN 96860504 LOCATION F10
 REV A

11/08/78

IC-FPLA,MODULE DR ADAPTER,AQ

FPLA I/O MNEMONICS

NO. 96860504
 DATE 11/08/78
 SHEET 2
 REV. A

IN	EQCODE	23	EQUIPMENT CODE MATCH
IN	Q00	21	Q REG BIT 0
IN	Q01	5	Q REG BIT 1
IN	Q02	9	Q REG BIT 2
IN	Q03	25	Q REG BIT 3
IN	AQREAD	6	A/Q INPUT TO A
IN	AQRITE	26	A/Q OUTPUT FROM A
IN	PRTHEM	24	PROTECTED I/O INSTRUCTION
IN	PROTEC	7	PROTECT JUMPER
IN	BUSY	8	DA BUSY BIT
IN	R1TOA	3	R1 REG TO A REG F/F
IN	AQROW	2	A/Q READ OR WRITE F/F
IN	WEQO	22	W FIELD IS EQUAL TO ZERO
IN	ALL	4	A REG BIT 11
IN	CLRDA	27	CLEAR DA
OUT	HWREJ	12	HARDWARE REJECT
OUT	DAROW	11	DA READ OR WRITE
OUT	AQRDRW	17	ENABLE AQROW F/F
OUT	HHEXEC	10	DA FUNCTION OR STATUS
OUT	CLRICO	13	CLEAR DA INTERRUPT CONDITIONS
OUT	AMUXO	15	A REG READ MUX SELECT
OUT	AMUX1	16	A REG READ MUX SELECT
OUT	QEQ8	18	Q00-Q03 EQUALS 8

FPLA SOURCE EQUATIONS

```

EQ   AQGRW = WEQO EQCODE AQREAD -Q00 -Q01 -Q02 Q03 + WEQO EQCODE
CONT AQRITE PRTHM -Q00 -Q01 -Q02 Q03 + WEQO EQCODE AQRITE
CONT -PROTEC -Q00 -Q01 -Q02 Q03 + WEQO EQCODE AQREAD -BUSY
CONT -PROTEC + WEQO EQCODE AQRITE -BUSY -PROTEC + WEQO EQCODE
CONT AQREAD -BUSY PRTHM + WEQO EQCODE AQRITE -BUSY PRTHM
CONT + WEQO EQCODE AQREAD -PROTEC AQROW + WEQO EQCODE AQRITE
CONT -PROTEC AQROW + WEQO EQCODE AQREAD PRTHM AQROW + WEQO
CONT EQCODE AQRITE PRTHM AQROW

EQ   HWREJ = WEQO EQCODE AQREAD PROTEC -PRTHM Q00 + WEQO EQCODE AQREAD
CONT PROTEC -PRTHM Q01 + WEQO EQCODE AQREAD PROTEC -PRTHM Q02
CONT + WEQO EQCODE AQREAD PROTEC -PRTHM -Q03 + WEQO EQCODE
CONT AQRITE PROTEC -PRTHM + WEQO EQCODE AQREAD -AQROW BUSY Q00
CONT + WEQO EQCODE AQREAD -AQROW BUSY Q01 + WEQO EQCODE AQREAD
CONT -AQROW BUSY Q02 + WEQO EQCODE AQREAD -AQROW BUSY -Q03 +
CONT WEQO EQCODE AQRITE -AQROW BUSY Q00 + WEQO EQCODE AQRITE
CONT -AQROW BUSY Q01 + WEQO EQCODE AQRITE -AQROW BUSY Q02 +
CONT WEQO EQCODE AQRITE -AQROW BUSY -Q03

EQ   DAROW = WEQO EQCODE AQREAD + WEQO EQCODE AQRITE

EQ   HWEXEC = AQREAD AQROW -Q00 -Q01 -Q02 Q03 + -PROTEC AQROW -Q00
CONT -Q01 -Q02 Q03 + PRTHM AQROW -Q00 -Q01 -Q02 Q03

EQ   AMUX0 = -WEQO + -EQCODE + -AQREAD + -Q00 -Q01 -Q02 Q03

EQ   AMUX1 = -WEQO + -EQCODE + -AQREAD + RITOA

EQ   -CLRICO = CLRDA + AQRITE A11 AQROW -PROTEC -Q00 -Q01 -Q02 Q03
CONT + AQRITE A11 AQROW PRTHM -Q00 -Q01 -Q02 Q03

EQ   QEQ8 = -Q00 -Q01 -Q02 Q03

END

```

FPLA PROGRAM PATTERN TABLE

PRODUCT TERM																ACTIVE LEVEL									
INPUT VARIABLE																H H H L H H H H									
NO.	1	1	1	1	1	1											7	6	5	4	3	2	1	0	
0	-	L	H	H	-	H	-	-	-	-	-	L	H	-	-	L	.	.	.	.	.	.	.	A	.
1	-	L	H	H	H	H	H	-	-	-	-	L	-	-	-	L	.	.	.	.	.	.	.	A	.
2	-	L	H	H	-	H	H	-	-	-	-	L	-	L	-	L	.	.	.	.	.	.	.	A	.
3	-	-	H	H	-	-	-	-	-	-	-	-	H	L	L	-	.	.	.	.	.	.	.	A	.
4	-	-	H	H	-	-	H	-	-	-	-	-	-	L	L	-	.	.	.	.	.	.	.	A	.
5	-	-	H	H	H	-	-	-	-	-	-	-	H	-	L	-	.	.	.	.	.	.	.	A	.
6	-	-	H	H	H	-	H	-	-	-	-	-	-	-	L	-	.	.	.	.	.	.	.	A	.
7	-	-	H	H	-	-	-	H	-	-	-	-	H	L	-	-	.	.	.	.	.	.	.	A	.
8	-	-	H	H	-	-	H	-	H	-	-	-	-	L	-	-	.	.	.	.	.	.	.	A	.
9	-	-	H	H	H	-	-	H	-	-	-	-	H	-	-	-	.	.	.	.	.	.	.	A	.
10	-	-	H	H	H	-	H	-	-	-	-	-	-	-	-	-	.	.	.	.	.	.	.	A	.
11	-	H	H	H	L	-	-	-	-	-	-	-	H	H	-	-	.	.	A	.	.	.	.	.	.
12	-	-	H	H	L	-	-	-	-	-	-	-	H	H	H	-	.	.	A	.	.	.	.	.	.
13	-	-	H	H	L	-	-	-	-	-	-	-	-	H	H	-	H	.	.	A	.	.	.	.	.
14	-	-	H	H	L	L	-	-	-	-	-	-	-	H	H	-	-	.	.	A	.	.	.	.	.
15	-	-	H	H	L	-	H	-	-	-	-	-	-	H	-	-	.	.	A	.	.	.	.	.	.
16	-	H	H	H	-	-	-	L	-	-	-	-	H	-	H	-	.	.	A	.	.	.	.	.	.
17	-	-	H	H	-	-	-	L	-	-	-	-	H	H	-	H	-	.	.	A	.	.	.	.	.
18	-	-	H	H	-	-	-	L	-	-	-	-	H	-	H	H	-	.	.	A	.	.	.	.	.
19	-	-	H	H	-	L	-	-	L	-	-	-	-	H	-	H	-	.	.	A	.	.	.	.	.
20	-	H	H	H	-	-	H	-	L	-	-	-	-	-	-	H	-	.	.	A	.	.	.	.	.
21	-	-	H	H	-	-	H	-	L	-	-	-	H	-	-	-	H	-	.	.	A	.	.	.	.
22	-	-	H	H	-	-	H	-	L	-	-	-	-	-	-	-	H	H	.	.	A	.	.	.	.
23	-	-	H	H	-	L	H	-	L	-	-	-	-	-	-	H	-	.	.	A	.	.	.	.	.
24	-	-	H	H	-	-	-	-	-	-	-	-	-	H	-	-	-	.	.	A	.	.	.	.	.
25	-	-	H	H	-	-	H	-	-	-	-	-	-	-	-	-	-	.	.	A	.	.	.	.	.
26	-	L	-	-	-	H	-	-	H	-	-	-	L	H	-	-	L	A	.	.	.	.	.	.	.
27	-	L	-	-	-	H	-	-	H	-	-	-	L	-	L	-	L	A	.	.	.	.	.	.	.
28	-	L	-	-	-	H	H	-	-	H	-	-	L	-	-	-	L	A	.	.	.	.	.	.	.
29	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.	.	.	A	A	.	.	.
30	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	.	.	.	A	A	.	.	.
31	-	-	-	-	-	-	-	-	-	-	-	-	-	L	-	-	-	.	.	.	A	A	.	.	.
32	-	L	-	-	-	H	-	-	-	-	-	-	L	-	-	-	L	.	.	.	A	.	.	A	.
33	-	-	-	-	-	-	-	-	H	-	-	-	-	-	-	-	-	.	.	.	.	A	.	.	.
34	-	-	-	-	-	-	-	H	-	-	-	-	-	-	-	-	-	.	.	.	A	.	.	.	.
35	-	L	-	-	-	H	H	-	H	-	H	L	-	L	-	-	L	.	.	.	A	.	.	.	.
36	-	L	-	-	-	H	H	H	-	H	-	H	L	-	-	-	L	.	.	.	A	.	.	.	.
37																									
38																									
39																									
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43																									
44																									
45																									
46																									
47																									

Q H E P Q A C A R A Q A P B Q
 0 Q C T 3 R R R T 1 1 R O S 2
 0 Q O M I D O O E T Y
 D E T A H A A E
 E M E D C

H D H C A A A Q
 H A H L M H Q E
 E R R R U U R Q
 X Q E I X X O 8
 E W J C O 1 R
 C O H

FPLA SOURCE DECK 11/08/78
 TITLE IC-FPLA,MODULE DR ADAPTER,DMA1
 PN 96860505 LOCATION L3/4
 REV A

IC-FPLA,MODULE DR ADAPTER,DMA1

NO. 96860505
 DATE 11/08/78
 SHEET 2
 REV. A

FPLA I/O MNEMONICS

IN	DMA5IN	24	SYNC IN FROM CONTROLLER
IN	READ	27	READ FROM DISK F/F
IN	DMA60	25	ENABLE DMA TRANSFER F/F
IN	WRITE	3	WRITE TO DISK F/F
IN	BYTE0	22	INPUT BYTE 0
IN	BLREQZ	9	BUFFER LENGTH EQUAL TO ZERO
IN	TESTMD	6	TEST MODE F/F
IN	MRCLR	2	MEMORY REQUEST CLEAR
IN	BLDEC	23	DECREMENT BUFFER LENGTH REGISTER
IN	INPRA	7	FIFO INPUT READY A
IN	INPRB	20	FIFO INPUT READY B
IN	INPRC	8	FIFO INPUT READY C
IN	INPRD	21	FIFO INPUT READY D
IN	BRFULL	26	OUTPUT BUFFER REGISTER FULL
IN	FLREQZ	5	FIELD LENGTH EQUAL TO ZERO
IN	FIFOEM	4	FIFO EMPTY
OUT	SHFIN0	15	SHIFT IN TO FIFO BANK ZERO
OUT	SHFIN1	16	SHIFT IN TO FIFO BANK ONE
OUT	INBYTE	12	CLOCK THE INPUT BYTE F/F
OUT	DECBLR	18	DECREMENT BUFFER LENGTH REGISTER
OUT	LSTDAT	11	LAST DATA
OUT	CLRB8	17	CLEAR OUTPUT BUFFER REGISTER
OUT	CLKMR	13	CLOCK MEMORY REQUEST F/F
OUT	XFERCH	10	TRANSFER COMPLETE

FPLA SOURCE EQUATIONS

NO. 96860505

DATE 11/08/78

SHEET 3

REV. A

```
EQ   SHFINO = DMASIN DMAGO READ -BLREQZ -BYTE0 + WRITE -MRCLR
EQ   SHFINI = DMASIN DMAGO READ -BLREQZ BYTE0 + WRITE -MRCLR
EQ   -INBYTE = DMASIN DMAGO READ -BLREQZ + WRITE -MRCLR
CONT      + DMASIN TESTMD READ -BLREQZ
EQ   -DECBLR = TESTMD -MRCLR + DMASIN DMAGO READ -BLREQZ -BYTE0 + WRITE
CONT      -MRCLR + DMASIN READ -BLREQZ -BYTE0 TESTMD + -BLDEC
EQ   LSTDAT = -INPRA -BYTE0 READ DMAGO + -INPRB -BYTE0 READ DMAGO +
CONT      -INPRC BYTE0 READ DMAGO + -INPRD BYTE0 READ DMAGO +
CONT      -BRFULL WRITE DMAGO
EQ   -CLRBR = -BRFULL WRITE DMAGO BLREQZ
EQ   CLKMR = READ BRFULL + WRITE -BLREQZ INPRA INPRB INPRC INPRD
EQ   XFERCH = TESTMD BLREQZ + -BRFULL FLREQZ BLREQZ FIFOEM
END
```

FPLA PROGRAM PATTERN TABLE

PRODUCT TERM																ACTIVE LEVEL								
INPUT VARIABLE																H H L H H H L L								
NO.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	7	6	5	4	3	2	1	0
	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0								
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P	P	T	D	A	A	F	A	C	I	F	R	S	P	P	R		E	T	B	K	F	F	R	C
R	R	E	E	S	G	U	D	L	T	D	E	T	R	R	E		R	D	Y	M	I	I	B	B
B	D	O	C	I	O	L	R	E	E	Q	H	A	C	Q		C	A	T	R	N	N	R	L	
				N	L					H	Z	D		Z		H	T	E		O	I		R	

FPLA SOURCE DECK 11/08/78
 TITLE IC-FPLA,MODULE DR ADAPTER,DMA2
 PN 96860506 LOCATION M3/4
 REV B

IC-FPLA,MODULE DR ADAPTER,DMA2

FPLA I/O MNEHCNICS

NO. 96860506
 DATE 11/08/78
 SHEET 2
 REV. B

IN	READ	27	READ FROM DISK F/F
IN	DMAGO	4	ENABLE DMA TRANSFER F/F
IN	WRITE	3	WRITE TO DISK F/F
IN	DMASIN	5	SYNC IN FROM CONTROLLER
IN	MCA	2	MEMORY CYCLE ACCEPT
IN	BLREQZ	25	BUFFER LENGTH REGISTER EQUAL TO ZERO
IN	OUTBYT	20	OUTPUT BYTE ZERO
IN	AUTOLOD	26	AUTOLOAD ENABLE F/F
IN	ADRFLD	24	ADDRESS FIELD F/F
IN	CLK	22	MASTER CLOCK SIGNAL
IN	QCNT0	6	OUTPUT COUNT ZERO
IN	QCNT1	21	OUTPUT COUNT ONE
IN	ICNT0	8	INPUT COUNT ZERO
IN	ICNT1	7	INPUT COUNT ONE
IN	CUERR	9	CONTROL UNIT ERROR
IN	N/C	23	NO CONNECTION
OUT	HRTGO	16	WRITE AND DMAGO
OUT	BUSSEL	13	BUS OUT MULTIPLEXER SELECT
OUT	CLKBR	11	CLOCK OUTPUT BUFFER REGISTER
OUT	CLKERR	10	CLOCK CONTROL UNIT ERROR
OUT	CLKOBY	15	CLOCK OUTPUT BYTE F/F
OUT	CLKLST	12	CLOCK LOST DATA F/F
OUT	OFIFO	17	WORD OUTPUT FROM FIFO
OUT	IFIFO	18	WORD INPUT TO FIFO

FPLA SOURCE EQUATIONS

```

EQ      WRTGO = DMAGC WRITE
EQ      -BUSSEL = DMAGO WRITE OUTBYT + AUTOLD
EQ      -CLKBR = READ -MCA + DMASIN -OUTBYT
EQ      -CLKERR = DMAGO READ DMASIN -CUERR + ADRFLD -DMAGO DMASIN -CUERR
CONT    READ + ADRFLD -DMAGO DMASIN -CUERR WRITE
EQ      -CLKOBY = DMASIN WRITE DMAGO
EQ      CLKLST = DMASIN -BLREQZ
EQ      -OFIFO = READ -CLK OCNT0 - OCNT1 -ICNT0 ICNT1 + READ -CLK OCNT0
CONT    -OCNT1 ICNT0 ICNT1 + WRITE -CLK OCNT0 -OCNT1 -ICNT0 ICNT1
CONT    + WRITE -CLK OCNT0 -OCNT1 ICNT0 ICNT1 + READ -CLK OCNT0
CONT    -OCNT1 -ICNT0 -ICNT1 + WRITE -CLK OCNT0 -OCNT1 -ICNT0
CONT    -ICNT1
EQ      -IFIFO = READ -CLK ICNT0 -ICNT1 -OCNT0 OCNT1 + READ -CLK ICNT0
CONT    -ICNT1 OCNT0 OCNT1 + WRITE -CLK ICNT0 -ICNT1 -OCNT0 OCNT1
CONT    + WRITE -CLK ICNT0 -ICNT1 OCNT0 OCNT1 + READ -CLK ICNT0
CONT    -ICNT1 -OCNT0 -OCNT1 + WRITE -CLK ICNT0 -ICNT1 -OCNT0
CONT    -OCNT1
END

```


COMMENT SHEET

MANUAL TITLE CDC®GB145 Module Drive Adapter

Hardware Reference/Maintenance Manual

PUBLICATION NO. 60475800

REVISION H

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BUSINESS
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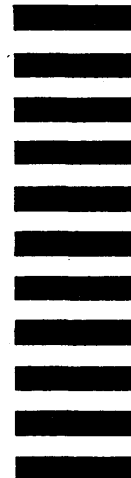
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